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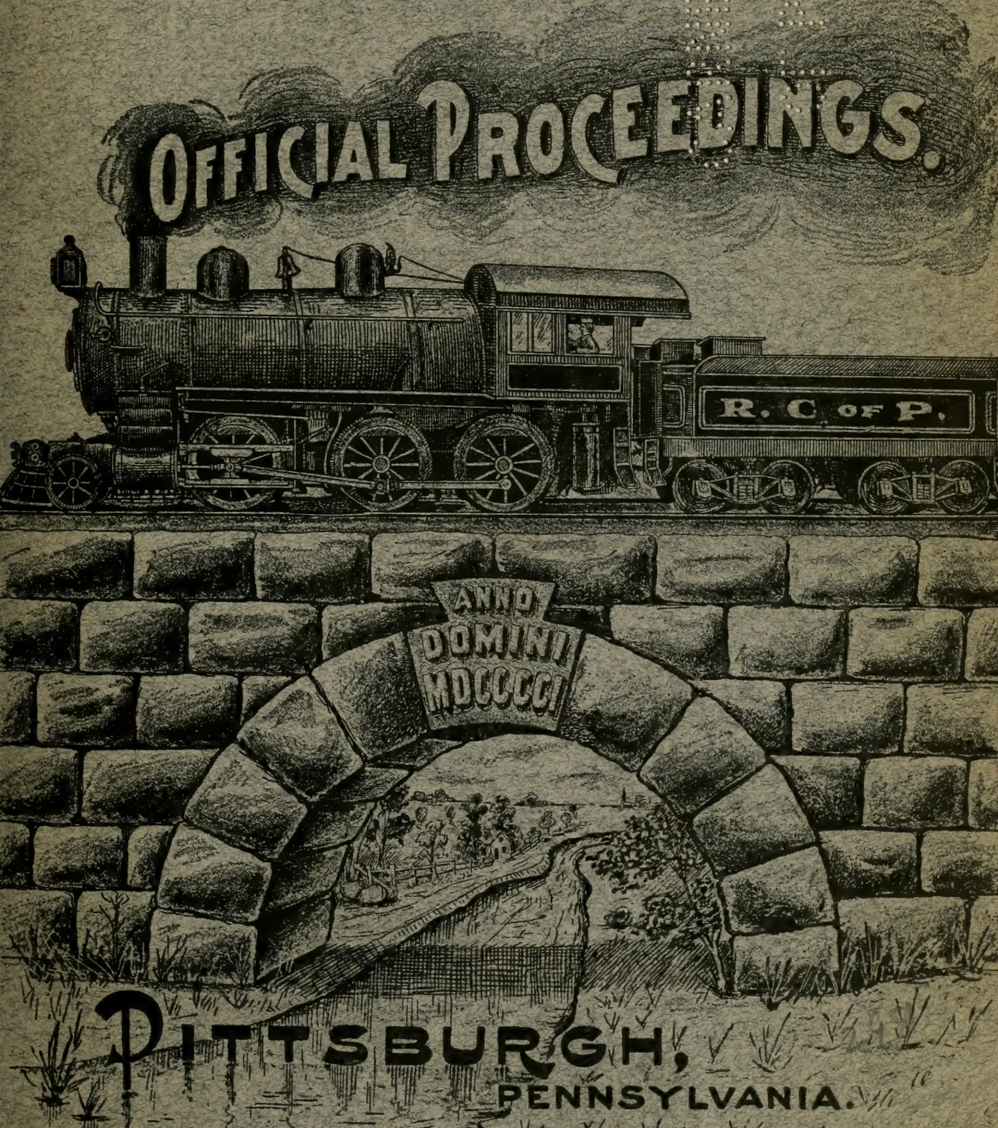

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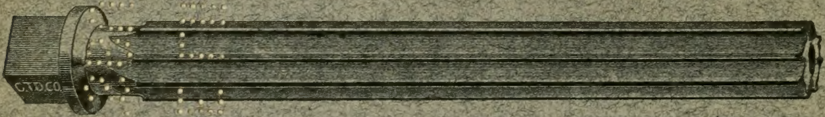

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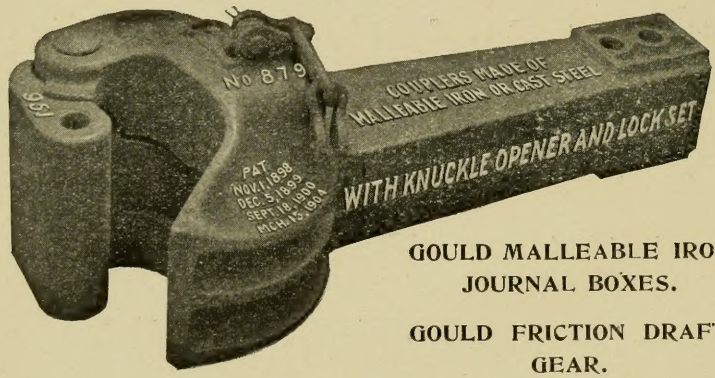
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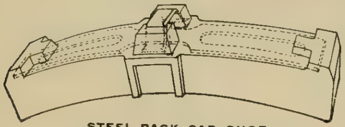

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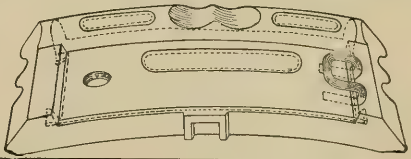

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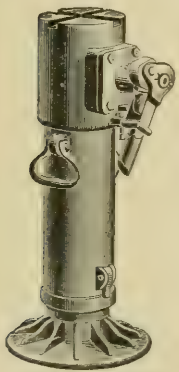

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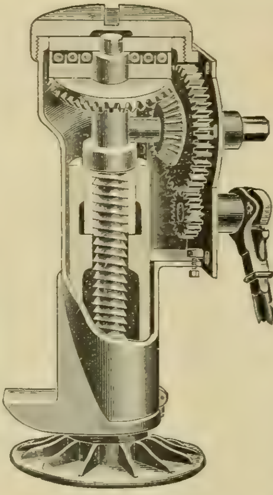

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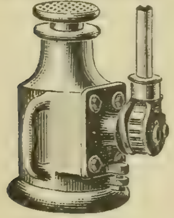

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of the
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ORGANIZED OCTOBER 18, 1901.

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Secretary,
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Chief Clerk, Supt. M. P., General Offices P. & L. E. R. R., Pittsburgh, Pa.

Executive Committee,

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Gen'l Manager Westinghouse Air Brake Co.
Pittsburgh, Pa.

C. L. GIST,
Superintendent Transportation, P. & L. E. R. R., General Offices,
Pittsburgh, Pa.

F. H. STARK,
Superintendent Rolling Stock, Pittsburgh Coal Company, Coraopolis, Pa.

Vol. IV.
No. 1.

Pittsburgh, Pa., November 25, 1904.

$1.00 Per Year
20c. per Copy.

Published monthly, except June, July and August, by the Railway Club of Pittsburgh,
J. D. Conway, Secretary, General Offices P. & L. E. R. R., Pittsburgh, Pa.

Meetings held fourth Friday each month, except June, July and August.

PROCEEDINGS OF MEETING,
NOVEMBER 25th, 1904.

The meeting was called to order at 8 o'clock, P. M., at the Monongahela House, Pittsburgh, Pa., with President L. H. Turner in the chair.

The following gentlemen registered:

MEMBERS.

Ayers, H. B.
Barnsley, Geo. T.
Bealor, B. G.
Bell, W. K.
Brown, John T.
Carson, G. E.
Conway, J. D.
Dambach, C. O.
Diamond, P. R.
Foller, C. S.
Gies, Geo. E.
Gilbert, E. B.
Grove, E. M.
Grubbs, Barton
Haring, Ellsworth
Harris, J. D.
Howe, D. M.
Jennings, F. R.
Johnson, A. B.
Kalbaugh, I. N.
Keith, J. T.
Keppel, A. M. Jr.
Kessler, D. D.
Knight, E. A.
Korba, W. J.
Krause, Julius
Lee, L. A.
Lindstrom, C. A.
Lobez, P. L.
Lynn, Samuel
Malloy, M. A.
Mason, S. C.
Michel, Wm. J.
Milligan, J. D., M. D.
McFeatters, F. R.
McIlwain, H. M.
McIlwain, J. D.
McMullin, F. V.
McNulty, F. M.
Nickel, J. K.
Noble, D. C.
Oates, G. M.
Obey, G. B.
Partington, Jas.
Polk, W. A.
Porter, H, V.
Quest, F. E.
Redding, D. J.
Rhodes, Geo. P.
Smith, D. W.
Summers, E. W.
Sweeley, G. P.
Synnestvedt, Paul
Taylor, H. G.
Tesseyman, J. E.
Thomas, Chas.
Tucker, John L.
Turner, L. H.
Wallace, M. E.
Warnock, H. R.
Wilson, W. J.

VISITORS.

Bigger, W. M., M. D.
Cole, F. J.
Ditchfield, Frank
Gerlach, J. J., Jr.
Gies, A. A. W.
McCauley, L. G.
Nicholls, R. D., M. D.
Setchel, J. H.
Smith, Sion B.
Stafford, B. E. D.
Stewart, W. J., M. D.

PRESIDENT: The minutes of the last meeting are in the hands of the printer, and if there are no objections will stand approved.

The Secretary announced the following proposals for membership:

Wm. E. Caldwell, Salesman, Cleveland Twist Drill Company, Lake & Kirkland Street, Cleveland, Ohio.

H. T. Coates, Jr., Motive Power Inspector, Pennsylvania Railroad Company, Thirtieth and Carson Streets, Pittsburgh, Pa.

J B. Fox, Storekeeper, Erie Railroad Company, Wilson Avenue Shops, Cleveland, Ohio.

S. R. Fuller, Jr., Sales Agent, Gould Coupler Company, 1 West Thirty-fourth Street, New York City.

J. S. Hobson, Assistant General Manager, Union Switch & Signal Company, Swissvale, Pa.

Chas. S. Hubbard, General Manager, H. M. Myers Company, Beaver Falls, Pa.

R. V. Lyons, Machine Foreman, Allegheny Shops, Pennsylvania Lines West of Pittsburgh, Allegheny, Pa.

Jos. McNaugher, Secretary, Latshaw Pressed Steel and Pulley Company, Grant and Pennsylvania Avenues, Allegheny, Pa.

W. L. Shafer, Editor and Publisher "Transportation," Stevenson Building, Pittsburgh, Pa.

Eliot Sumner, Assistant Engineer of Motive Power, Pennsylvania Railroad Company, Altoona, Pa.

John Ware, Division Engineer, Baltimore & Ohio Railroad Company, Connellsville, Pa.

John H. Wynne, Mechanical Engineer, Illinois Central Railroad Company, Central Station, Chicago, Ill.

Chas J. Isler, Division Operator, Pennsylvania Railroad Company, South Thirtieth Street, Pittsburgh, Pa.

J. A. Gearhart, Motive Power Inspector, Pennsylvania Railroad Company, 1013 Penn Avenue, Pittsburgh, Pa.

J. H. Caldwell, Foreman Purchasing Department, Pressed Steel Car Company, McKees Rocks, Pa.

PRESIDENT: When these names have been favorably passed upon by the Executive Committee, the gentlemen will become members.

Secretary Conway then read the following communication from Vice President F. T. Hyndman:

DUBOIS, PA., Nov. 15, 1904.

To Officers and Members Railway Club of Pittsburgh, Pa.

Gentlemen:—Kindly accept my resignation as Vice President of the Railway Club of Pittsburgh, to which position I have been honored with a second term. I assure you all, that I appreciate this distinction.

I have been called upon to accept a better position than the one I now occupy, in New England, with offices at New Haven, Conn., and will leave November 17th to assume my new duties.

Thanking you all for the many courtesies extended to me, and sincerely hoping that the Railway Club of Pittsburgh will continue to grow until it becomes the leading railway club of America, I am,

Very truly yours,

F. T. HYNDMAN.

PRESIDENT: We all deplore the fact that Mr. Hyndman had to leave this part of the country; but he appreciates the fact very fully that it is for the best interests of the Club that its officers all live in or near Pittsburgh. Under the circumstances I think we ought to accept his resignation, with a vote of thanks for the valuable and willing services rendered by him to the Club, and accompanied by our best wishes for his success in his new field of labor.

ON MOTION the resignation is accepted in the form and spirit of the President's suggestion, and the Secretary instructed to notify Mr. Hyndman accordingly.

PRESIDENT: Under the head of New Business I want to say a word in regard to the work for the coming year. The interest of the Club is maintained by the quality of the papers which we have. It has been quite difficult in the past to get good papers and good discussions, though we have had some good ones and very interesting meetings resulted. But I have a recommendation to make to-night, and I would like to hear a free discussion upon it, because I think it will result in a benefit to the club.

For the advancement of the interest of this Club as a whole and the members individually, I have a suggestion to make, to the effect that we have a Subject Committee appointed, which shall consist of at least one representative from each railroad entering Pittsburgh, also one from each of the large lines with which some of our members are connected. The Committee to be made up from each department engaged in practical railroad operation. The several members making up the general committee to act as Chairman of sub-committees, one for each of the different branches of the work. What we must have is up-to-date men gathering information on the live topics of progressive railroad operation and maintenance. None of us know so much but what we can profit greatly by work of this sort. Another decided benefit will be of bringing into action a larger working membership. We have a large number of able, intelligent men, who come to the meetings month after month and never say a word, not because they cannot give us lots of information, but simply because they have not been put to work and they are the ones we want on subjects that are in their particular line.

It is my thought that we follow along the line of subjects that are the most important and possibly least understood, which will be considered by the M. C. B. and M. M. Associations. We have gratifying evidences of the appreciation of the work done by this Club in the past, and is illustrated by requests for additional copies of our published proceedings, which would not be in demand if they were not considered of value.

The work of our Standing Committee on M. C. B. rules and prices carried more weight and were more generally adopted than any others presented to the M. C. B. convention at Saratoga last June, simply because the matter was handled intelligently by intelligent men. If it meets with your approval we should pass a resolution that a Committee on Subjects be appointed at once and inasmuch as the Vice President has but little to do, I recommend he be made Chairman.

I would like to hear an expression from the members as to what they think of this idea.

MR. J. D. M'ILWAIN: Mr. President—As far as I understand your suggestion I approve of it, but I would like a little more light on your idea. Is it that a general committee be appointed and that committee appoint sub-committees on different lines of work?

PRESIDENT: My idea is to appoint a mechanical engineer from one line, a civil engineer from another, a transportation man from a third, and so on; the general committee to have sub-committees headed by the expert in the general committee. If it is a mechanical engineer, let him have a committee of mechanical engineers to support him. With a transportation man, the same. In that way we ought to have first-class papers every meeting, and good discussions. And that is what is going to maintain the interest of the Club. We have a good reputation now and we want to keep that up. Personally I have a great objection to being tied up with a "dead one."

MR. J. D. M'ILWAIN: As far as I am concerned, I approve of the idea—and dock the man who will not take care of the business when he is appointed.

MR. GEORGE T. BARNSLEY: I think a development of this idea is just what this Club needs. It now has a large membership, and without looking too brightly to the future there is no reason in my mind why it should not be the leading railway club in the United States, if not in America. As I understand it, this work of getting the papers has been borne practically by the President alone. He has carried the heavy load. Now, it is hardly right that a man occupying the honorary position of the Club and watching over its general policy and welfare should be loaded down that way. And furthermore, with the large number of prominent men who are members, I am quite sure that a committee such as is suggested will bring out far more than a man single handed could do. There are so many things in the railway world that can, and should be, considered. We have only about ten meetings a year to consider papers. With such a committee to decide on the important subjects, and select experienced men to take up the matter and develop it with a formal paper, the Club will be working in the right direction to produce the best results. I heartily approve of it, because it will bring forth the various phases of railway work.

MR. H. B. AYRES: It seems to me that this is the right way to start about interesting a larger number of members, personally. If a man is on the committee he certainly will do a great deal more work if the work is given him directly to do than if he simply comes to a meeting and listens to a paper without any requirement for any work on his part to come prepared to take part in the discussion.

MR. D. J. REDDING: Mr. Chairman, I agree with all that the other gentlemen have said, and I will offer a motion that the President be authorized to appoint such a committee.

The motion, being duly seconded, was put to vote and carried.

PRESIDENT: I will postpone the appointment of this committee until I can look over the list carefully.

The next order of business is the election of officers, and the Chair will receive nominations for the office of Vice President to fill the vacancy caused by the resignation of Mr. Hyndman.

MR. D. J. REDDING: I believe that for the office of Vice President we should have some man located in the Pittsburgh district, active and qualified to pass judgment upon the matters that come up in railway club administration. I take pleasure in nominating for the position Mr. A. Kearney, Superintendent of Motive Power of the Baltimore & Ohio Railroad, of Pittsburgh.

ON MOTION, nominations are closed, and, there being but one nomination for the office, Mr. Kearney, upon motion, was unanimously elected Vice President.

PRESIDENT: The paper for the evening is on The Automobile versus Railway Transportation, by Mr. Paul Synnestvedt, whom I have the pleasure of introducing to you.

AUTOMOBILE vs. RAILWAY TRANSPORTATION.

BY MR. PAUL SYNNESTVEDT.

Comparison Between Conditions to Be Met in Railroad Service and Those Which Must Be Considered in Automobile Transportation.

An automobile is not a locomotive. By this we mean that the conditions under which the automobile must operate are so different from the conditions that exist in railroad service, and the field to be covered by each is so different from the other, that no mechanism properly designed for use in the one line of work can be employed in the other with any degree of success. There seems to be in the minds of some an idea that the automobile is to be regarded as a future, if not a present, competitor of the railroad, but it is believed by the writer that such idea originates in failure to recognize the differences relating to the different conditions under which the two devices must operate, and we believe that it will be apparent on careful study of the situation that instead of there being competition such as is suggested, the automobile will become in time a most important adjunct to the railroad, particularly in the handling of freight traffic, the two forms of transportation supplementing each other, instead of competing.

While it is true, and I think it may be said startlingly true, that speeds approximating or exceeding even the higher railroad speeds have been obtained on highways with some of the more modern fast racing automobiles, it does not necessarily follow that anything of that kind is a possibility or a desirable thing in regular service. It need not be pointed out to anyone who has ridden in an automobile at a speed in excess of twenty-five or thirty miles an hour that such speeds as are attained in some of the great races, running up above seventy or eighty miles an hour, are dangerous in the highest degree, not only to the drivers of the machines, but also to the inhabitants along the highways, and that to attain the speed in question, the use of a rail and a flanged wheel, eliminating both the unevenness of the road surface and the dangerous element involved in the necessity for steering gear and its correct manipulation, is absolutely essential to safety.

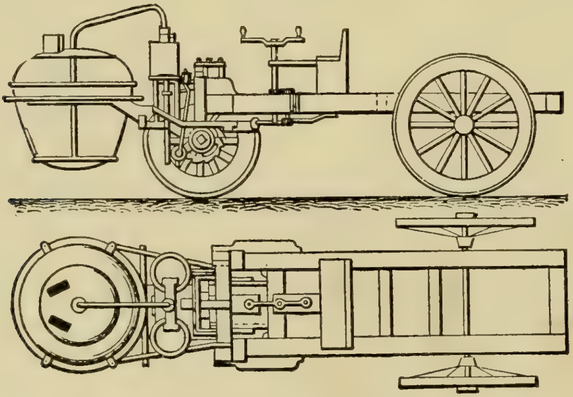
The condition in question, that is the danger attendant upon high speed running on any surface other than a steel railroad track, has in fact been recognized for some generations past, in testimony whereof we have the numerous adverse laws that have been passed by different countries, and the troublesome local restrictions that have been applied at different times and in different places to all kinds of mechanically propelled vehicles. To say that the laws are unreasonable and born only of the prejudice of an uneducated people, is not correct, for although they have been carried to an extreme, it is self-evident that they are in reality based fundamentally upon the recognition of the danger attendant upon high speed automobile transportation. As is always the case in matters of this kind, regulations and restrictions of this character have swung back and forth like a pendulum, between opposite extremes, and we have on the one hand the conditions that existed in certain years early in the past century in England, wherein laws were passed abolishing the tolls on steam propelled vehicles, in order to encourage the development of that kind of transportation, and on the other hand, the condition that existed for many years in the recent past in England, wherein the restrictions as to speed and operation were so strict and severe as to almost put a stop to the development of the industry, it being required even that no vehicle of such character should be used on a public highway without it being preceded at some distance by a flagman to caution all other users of the road as to its coming.

HISTORICAL REVIEW.

That the automobile is not a new thing is evident from a search of the historical records, which show that road traction by steam was suggested over a century ago, and that spring power motors had been tried previous to that time in certain sections of Continental Europe, as well as certain windpower devices, which had been used on the plains of the Netherlands.

It is said that about 1680 it was suggested to use a road wagon with a steam boiler, having a rearward jet of steam blowing against the atmosphere to secure propulsion of the vehicle. It also appears that Dr. Robinson, as early as 1759, suggested the idea of the application of a steam engine in the propulsion of road carriages, but nothing practical was attained at that time as the result of such suggestions.

More progress at this time was made on the continent of Europe than in England in development of mechanism of this class, and finally a running steam wagon was constructed by Cugnot in 1769, and a second one by the same man in 1770, the last mentioned being illustrated herewith in Figures 1 and 2.

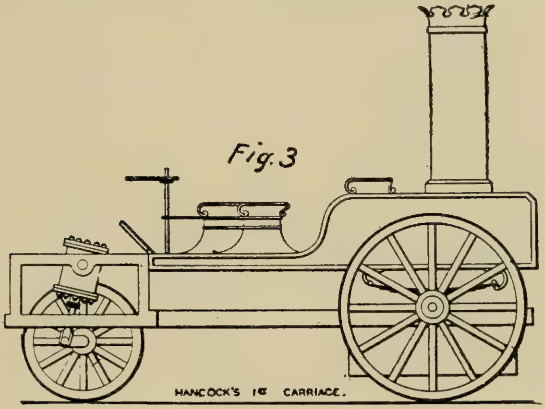


FIGS. 1 AND 2.—CUGNOT'S SECOND ROAD WAGON, 1770.

Examination of the annexed cut will show that this construction comprised a boiler and driving gear mounted on and in connection with the driving wheel, the same wheel being used for the steering mechanism by having it pivoted on what has been more recently termed a "fore carriage." It is noticeable that such fore carriage construction has appeared again and again in the development of the automobile up to the most recent date, but has apparently never reached any very prominent place among the devices which have gone into practical use.

Another improvement in the art was worked out by a man by the name of Hancock about the year 1830, and two different types of carriage or wagon constructed by Hancock are shown, respectively, in Figures 3 and 4.

Fig. 3



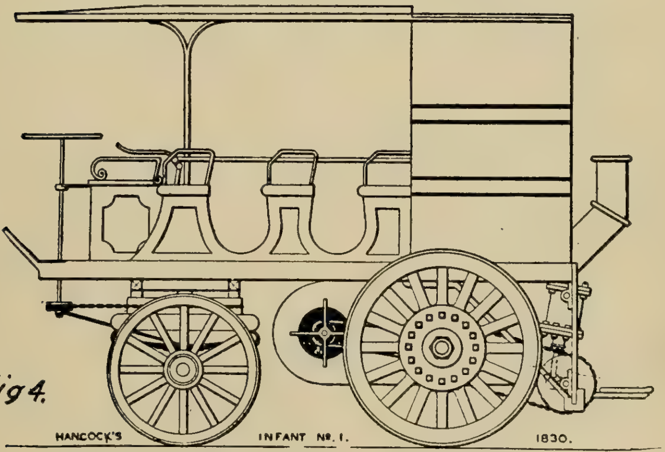
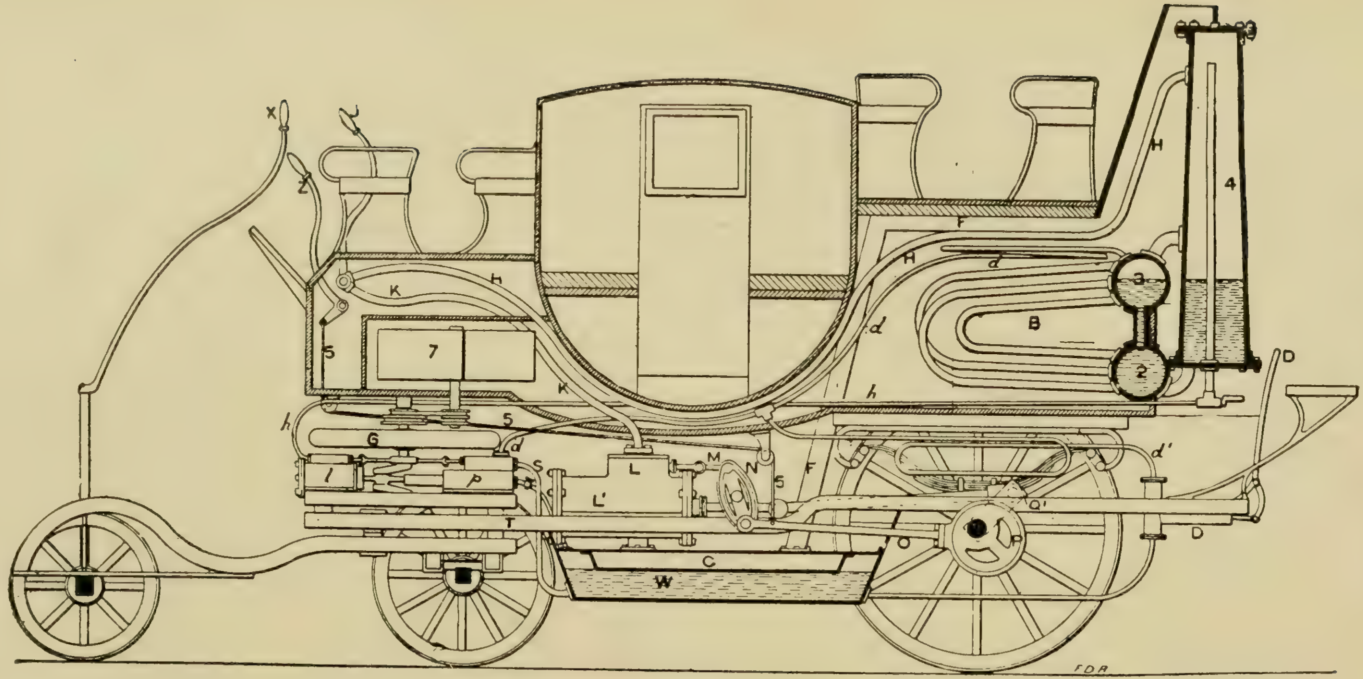


Fig 4.

It will be observed upon examination of Figure 3 that Hancock also followed the type of construction which has been called a fore carriage design, the motor cylinder being mounted on a revolving frame at the forward end of the carriage, and constructed to drive a single wheel in the center of the frame, which was also used as a steering wheel. This arrangement was apparently not altogether satisfactory to the designer, as it appears from Figure 4 that the mounting of the



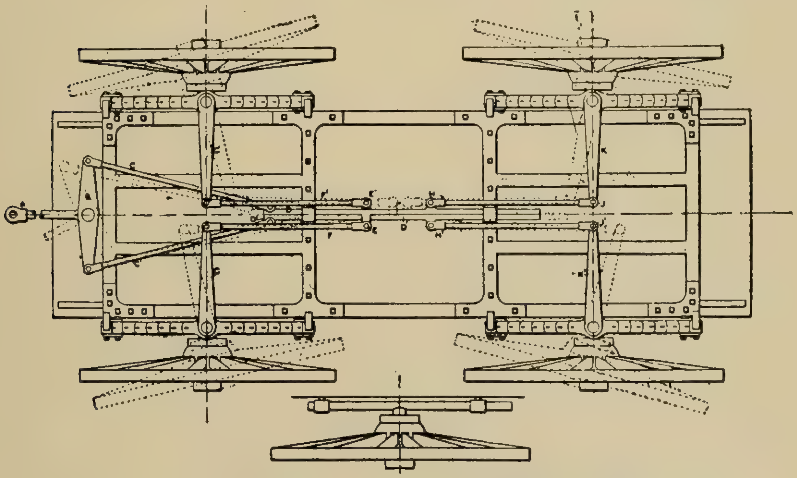
—Goldsworthy Gurney's Steam Coach, 1826-28.

Fig 5.

driving gear and the attempt to propel the carriage from the steering wheel was abandoned, and the driving of the carriage shown in Figure 4 was accomplished by means of the rear wheels, the steering being done by the front wheels after the manner of the usual construction of carriage, with addition, however, of a wheel actuated chain device for turning the forward axle and wheels.

STEERING MECHANISM.

That the problem of securing proper steering devices was one that gave the early constructors much trouble was apparent from the form of the device shown in Figure 5, which shows a steam coach constructed by Goldsworth Gurney about 1826, the said coach employing a kind of tricycle at the forward end, the forward wheel whereof had a steering handle marked X, and still other devices for steering the vehicles have been employed at different times, and among such plans have been suggested at times to turn all four of the wheels, as for example in the Gibbs construction, indicated in Figure 6.



Gibbs' Radial Action All-Wheel Steering Gear

Fig. 6

Other designers have undertaken to do their steering by the rear wheels, doing the driving on the forward wheels. To those who have not had practical experience in the operation of steering devices on automobiles it might appear that some of these schemes were preferable to the one which is so commonly employed, which is indicated in Figure 7, and has been in use for several generations according to the best authorities, but so far nothing appears to have been proposed which in the ordinary four-wheeled vehicle will meet the requirements of service in as simple and satisfactory a manner as the commonest form of construction now used, which, as stated, is shown in Figure 7.

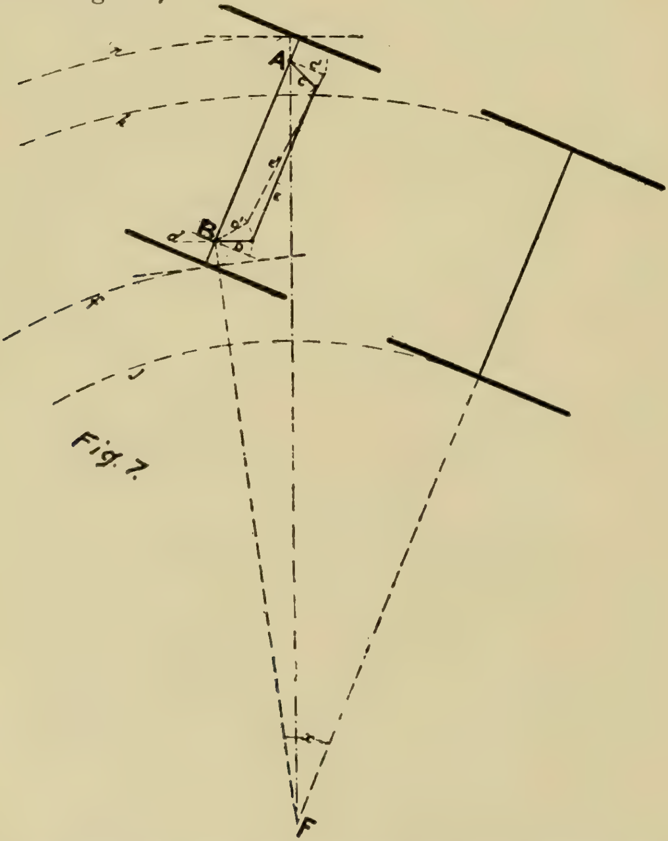


Fig. 7

The principal objection to using the rear wheels for the steering wheels appears to be the difficulty in such use in getting the vehicle away from the curb, which cannot be done if it stands close to the curb without backing up, since the wheels cannot be turned toward the curb far enough to cause the forward end of the vehicle to run off from the curb at an angle, as can be done where the steering is done with the front wheels.

The form of construction indicated in Figure 7 is typified by the mounting of the steering wheels in vertical pivots near the hubs of the wheels, the said pivots carrying the steering knuckles in which the hub shafts are secured, and the knuckles having backwardly projecting arms marked in Figure 7, C and D, respectively, which are connected by a cross bar—the arms as shown being at an inclined angle relative to the longitudinal axis of the vehicle, the purpose of such inclination being to cause the two steering wheels to take slightly different angles to compensate for the difference in the diameters of the circles which each must describe in turning a corner. This operation is clearly indicated by the dotted lines in Figure 7. The amount of angularity of the rearwardly projecting arms on the steering knuckles determines, of course, the difference in curvature to which the movement of the wheel is adapted, and is in a measure a compromise, since different radii of circles would require different angles, while practical conditions necessitate the use of something permanent and fixed. The device in practice works very well, however, and seems to be not only the simplest, but the best in the long run. As a means of moving the steering wheels about their vertical pivots either a lever or what is called a wheel-steering device can be used, these being but instrumentalities for applying the power of the hand. The wheel is generally used with an inclined shaft having a worm gear at the bottom which transmits motion to a lever connected with either the levers C or D of the device, shown in Figure 7, by a cross rod.

It should be observed in connection with the subject of steering devices that, while it seems to be in a way an unimportant part of the gear, the steering mechanism is in fact the most vital to the safety of the occupants of anything about the mechanism, since if the steering gear goes wrong while the vehicle is running at speed, only the greatest good fortune can prevent the most serious consequences, while almost any other portion of the mechanism can give out without producing results as dangerous to life as that produced by failure of the steering gear.

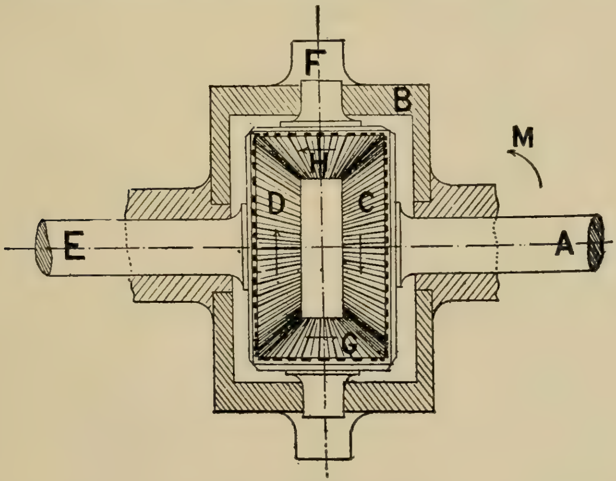
It is this feature of automobile construction which forms one of the drawbacks or restrictions to the field of usefulness of the machine; for even assuming that the steering mechanism be durable and almost indestructible in its construction, it yet remains to be noted that it must be manipulated by the mind and hand of an operator, and there is a large margin for accident or mistake due to the frailties of human nature which does not exist in the running of cars on rails with flanged wheels.

DRIVING MECHANISM.

Another point wherein the automobile differs radically from the railroad type of motor construction or carriage design has reference to the necessities, associated directly with the employment of steering gear, involving the requirement that the driving wheels should have a capacity of independent rotation. Slippage of one wheel or the other is not permissible for several reasons. In the first place, the character of the surface over which the vehicle must run, varying as it does, winter and summer, from good roadbed to one which is very slippery and treacherous, would make it impossible to operate a vehicle which did not have good adhesion to the roadbed, such as is secured for example by the use of rubber tires, commonly used. It being necessary then to have good adhesion between the driving wheels and the driving surface or roadbed, it follows of course that in order to turn corners some mechanism is required which will allow the one driving wheel independent rotative movement relative to the other.

The most common scheme employed to accomplish this result, and in some respects the simplest, is of course a separate motor for each of the driving wheels. And such was the first plan followed, and such is in fact one of the most common forms of construction in the recent large size electrical vehicles used mostly for commercial work. In the development of the gasoline vehicle, however, the use of two separate driving engines and two separate sets of driving mechanism produces such additional complications as to be practically prohibitive, and therefore means had to be provided for overcoming this difficulty. Such means have been embodied in what is commonly known as a "differential gear," one form whereof is shown in Figure 8. This device, or the foundation on which it is constructed, is said to have been invented in about the year 1834 by a man by the name of Roberts, of Manchester. Before it was developed the steam-propelled vehicles theretofore used had employed certain forms of clutches or pawl and ratchet devices to afford the requisite compensating movement of the two driving wheels where single motors were used.

At the present time where single motors are employed the differential gear is practically the only device which is considered for the purpose. It exists generically in two principal forms, both, however, based on the same principle of operation. The first one is the so-called "bevel gear" (differential), which is shown in Figure 8, annexed; and the other is a modification thereof in which in place of the beveled form of gears the ordinary spur gear is used, this requiring in place of each of the small gears shown on the annexed Figure 8, two gears intermeshing with each other, and one of each of the two meshing on each of the opposite gears marked C and D. Of course in driving straight ahead, this gear, whether it be of the bevel or



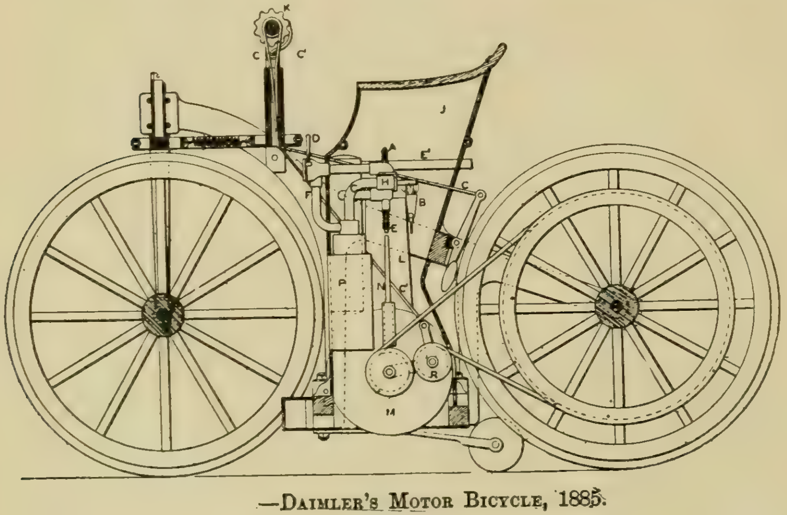
Theory of the Differential Gear.

AE. Divided halves of axle.—C D, Bevelled-gear pinions, fixed to extremities of divisions of axle.—G H, Bevelled-gear pinions fixed, to the case B.—B, Revolving case, carrying the pinion driven by the motor.

FIG. 8. —Differential.

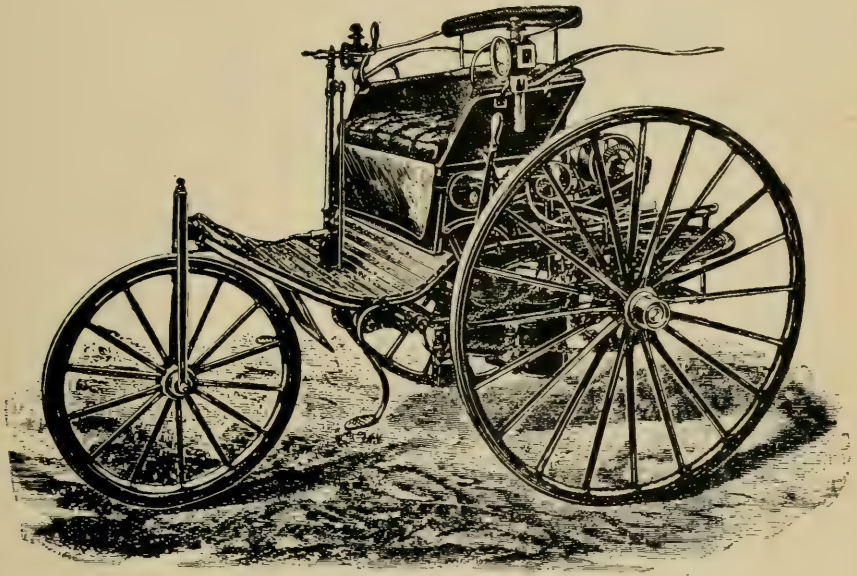
the spur gear type, does not cut any figure in the driving operation, all of the parts revolving together as if it were an integral whole, but when more resistance has been encountered by one of the wheels than by the other, as in turning a corner, there is a relative rotation between the gears D, H and C, which allows one to speed up just in proportion as the other is retarded, the several parts coming back again to the same relative position when the vehicle again assumes the straight-ahead movement.

Although the differential gear, as already shown, is a device that has been known for approximately three-quarters of a century and has been largely used in connection with steam traction engines which were developed along with the development of agricultural machinery, still very little progress was made in connection with the development of self-propelled vehicles, or automobiles, for many years preceding the year 1880 or the few years immediately following. The Germans gave some little attention to the matter, however, about the time mentioned, and the petroleum engine was developed by a German by the name of Diamler, which was applied to a cycle construction which is shown in the annexed cut marked "Figure 9." This was followed shortly afterward by a construc-



—Daimler's Motor Bicycle, 1885.

Fig. 9.



Benz Second Motor Tricycle Carriage.
Made in 1886, and ran at 10 miles an hour maximum.
Fig. 10

tion shown in the cut marked "Figure 10," made by the Benz people, such construction being one of the earliest developments of the modern art of automobile building.

About this time the steam vehicle proposition was again taken up with renewed interest, and the vehicle shown in Figure 11 was constructed by Bollee, this being built in 1881 and being one of the earliest types which discloses some of the features so characteristic of the present style of best known automobiles. It will be observed on examination of this cut that it had the motor cylinders placed in a kind of bonnet in the fore part of the vehicle with the power transmitted by lingitudinal shaft and beveled gearing to a counter shaft at the rear in advance of the axle, and from the counter shaft by chain drives to the driving wheels. This is fundamentally the system of transmission most commonly used in many of the present day constructions, some of them differing slightly, however, in placing the differential gear directly on the driving axle, and driving by the bevel gear on the exterior of the differential in that place, doing away thus with the counter-shaft, but introducing what is known as the divided axle, and some difficulties in construction incident thereto which the construction shown in Figure 11 avoids. This structure shown in Figure 11 also discloses substantially a similar form

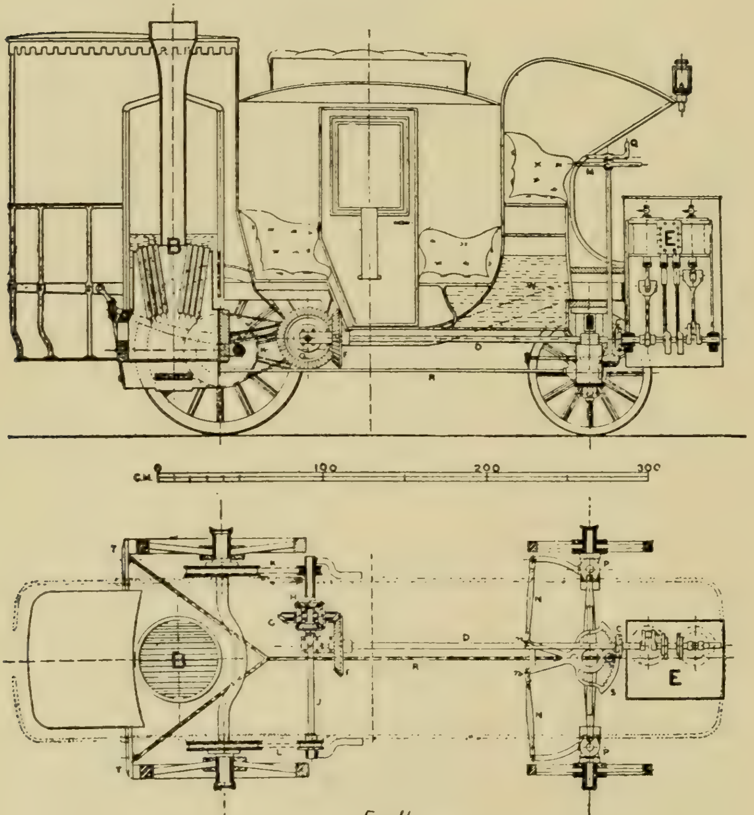
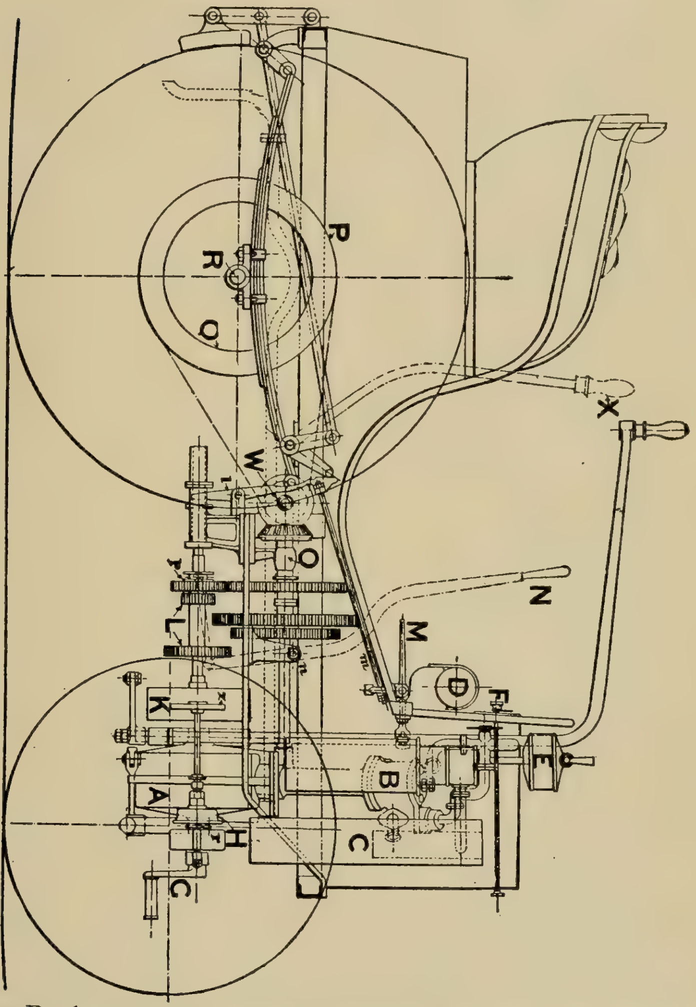


Fig. 11.

—Bollée's Steam Coach, 1881:

of steering gear to that which has been standard for so many years, and about the accepted distribution of weight, which is with a large proportion of the weight on the driving wheels to avoid slipping in bad weather.

Substantially similar ideas of construction are embodied in another type shown in Figure 12, which is the vehicle built



Panhard & Levassor's Daimler Motor Carriage, 1894.
Fig. 12.

by the Panhard and Levassor Company in 1894, this vehicle also showing the engine disposed in the forward end and driving by longitudinal shaft, bevelled gear and counter-shaft having chain drives at its ends connected to the driving wheels.

MOTIVE POWER.

In the vehicles most commonly used at the present time there are in general three different classes of motor employed, each of which has its admirers and ardent advocates. Steam is the one that has been longest used, and it has reached a very high state of development, but it is to be said that for vehicle use the ordinary form of boiler has not proven very satisfactory. The so-called instantaneous, or flash boiler, has, however, been developed to a high state of efficiency, and the writer has been informed that in one boiler of such construction recently built an evaporative efficiency was obtained of approximately 16 to 1. The method employed in connection with these boilers is to afford automatic means for by-passing the water around the boiler when the pressure of the steam goes too high, the stoppage of steam generation being thus attained by cutting off the supply of water to the boiler, which in view of the common practice in ordinary boiler construction would appear to be a very dangerous and doubtful expedient, but appears to work very satisfactorily in automobile mechanism.

The gasoline vehicle has reached its high state of development within a comparatively few years, and appears to be the most popular style at the present time, although it is open to a number of serious objections. In a gasoline vehicle there seems to be the possibility of combining at one and the same time a very high horse-power, which means great speed and hill-climbing ability with comparatively moderate weight, but the question of economy of operation is considerably in dispute. Some users of gasoline vehicles report very unfavorably on the last mentioned point, while others make claims which in some instances are obviously preposterous. One of the best authorities on automobile work in an article written some months since makes the statement that it costs as much to lubricate one of these gasoline engines as it does to supply it with fuel, and other parties competent to pass on questions of this kind have signified to the writer their agreement with this proposition, extreme as it may appear. Other items to be considered in connection with gasoline work are the increased cost of insurance, both on the vehicles and the premises where the same is stored, and the disagreeable incidents that attend the use of volatile oils of this character.

In the electrical vehicle considerable progress has been made in the last few years in the line of developing commercial wagons, that is, wagons for hauling goods and passengers in regular passenger service between local points not too far distant from each other. This appears to be in every respect practically the ideal form of motive power for this service, and improvements made in the batteries as well as the equipment in various ways leads one to expect that this form of vehicle has established for itself a permanent place in the commercial world and will gradually gain in standing for utilitarian purposes, and will become in the no distant future a valuable adjunct to the railroad companies in handling the local transfer of their freight, and in short feeders for the main lines.

One type of commercial wagon which has been constructed right here in Pittsburgh and has been in use the past season in Atlantic City by one of the hotels there, is shown in the annexed cut marked "Figure 13." This vehicle is electrically driven, and has given most excellent results, both in operation and in economy. The large number of inquiries which this vehicle has brought to the builder indicates a very widespread interest in this type of service, and a future demand for this class of vehicle which will be very great in the immediate future. The tendency in commercial wagons at the present time appears to be toward large carrying capacity with slower speed, and this is felt by the writer to be in the right direction, since the low speeds are not dangerous and the large carrying capacity brings the cost per ton mile down to a basis where it can be offset advantageously against the cost by animal traction or by other means. Careful record

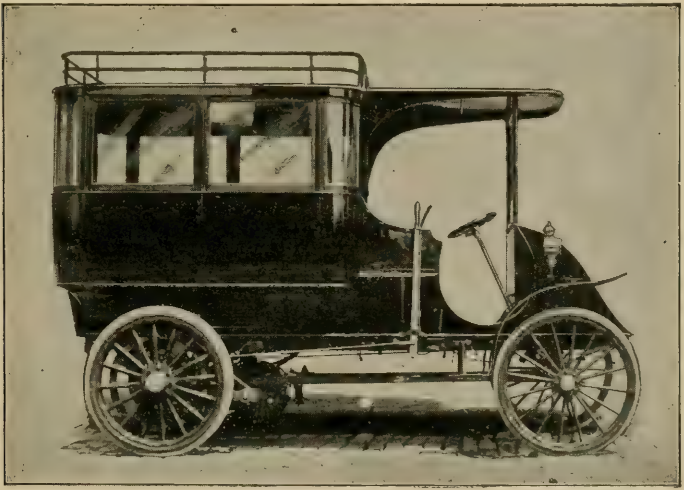


Fig. 13.

kept by parties who have given the matter exhaustive test shows that mechanical traction in electric automobiles of this character will improve on the results secured by horse service by a large percentage.

MR. SYNNESTVEDT, continuing: Now in submitting this I should like to make a few additional remarks. In the first place as to the treatment I have given here to the subject of the steering mechanism. The steering gear, as stated in the article, is a very important part of the machine, and it is the necessity of a steering device and the manual control of that device that renders the automobile's field of usefulness so restricted. A speed in an automobile exceeding 25 or 30 miles an hour, especially if the roadbed is not very good, makes it very troublesome and dangerous to manipulate the steering gear. And the general tendency, as stated in the paper, seems to be for commercial work to cut the speed down to even as low as seven or eight miles an hour or less, and increase very much the carrying capacity of the machines. From this it is apparent that the field of usefulness for an automobile is mainly limited to the local transportation of goods and passengers, and that there does not seem to be any possibility of developing that field to a point which might be suggested by the great speeds that have been attained in some of the races, such as is stated to have been even over 80 miles an hour.

It is to be remembered that in those races the expense of driving a car at that speed is something very great. The wear and tear on the machine on account of the irregularities of the roadbed is something ferocious, and the danger is, as stated, something that any reasonable man would not want to undertake. Beside that, the load carried on these machines is practically only one or generally two passengers, and considering the weight of the machine, which runs up anywhere over 2,000 or sometimes 3,000 pounds, the paying load, as it would be called on a railroad, is absurdly small.

If there are any inquiries concerning any of the points brought out in the paper, I will be very glad, if I can, to make reply to them.

MR. E. M. SUMMERS: There is one thought brought out in this paper that brings to mind the uncomfortableness in riding in a vehicle, wherein the load, or the greater part of it, is put on the driving wheels, by placing a portion of the occupants of the vehicle back of the rear wheel and then going at a speed through the country where we like to ride, and are tossed up and down. I have no doubt that there are a great many here who, in riding in that part of the vehicle, have held on to the side of the seats as they jumped up to guide themselves to come down onto the seats again. It appears to me that to avoid such a thing as that the power should be applied to all four wheels. And with that idea in view I should like to ask Mr. Synnestvedt about what are some of the difficulties in applying power in that way.

MR. SYNNESTVEDT: There is no question but that the application of power to all four wheels would be preferable, if sufficiently simple mechanism could be devised to accomplish it practically without too much expense and without too much danger of disarrangement. There have been different devices suggested, and some constructed, with driving gear attached to all four wheels. The chief trouble in doing that arises from the necessity of having steering wheels pivoted at the hubs, which makes it necessary to set a motor on the steering wheel, or in lieu of that to have some kind of flexible driving mechanism connecting the steering wheels and the supporting axles which will allow the wheels to be driven and yet permit them to be turned about these vertical axles to get the steering effect. So far as my knowledge extends there is no vehicle in which that has been done which has met with any very great degree of practical success. But, as stated before, it would certainly be an ideal form of construction if it can be accomplished.

This difficulty mentioned by Mr. Summers to the riding immediately over or behind the driving axle, is one that has been noted by a great many people, and the application of power to all four wheels would enable the distribution of the weight to be made so as to avoid that. There are other things that have been done to throw most of the weight on the driving wheels and still get a better location of the seats, however. Such, for example, as the location of the machinery and the weighty parts of the mechanism immediately over the wheels with the seats somewhere between the two axles.

PRESIDENT: Are there any further questions? If not, we will close that order of business.

We have with us to-night a number of railway surgeons, and I understand that Dr. Milligan has been selected to represent them on the floor.

DR. J. D. MILLIGAN: Mr. President, I first want to say that after this valuable paper I would ask you to entertain this motion, that a vote of thanks be tendered Mr. Synnestvedt for the time and labor he has spent in enlightening us.

The motion being duly seconded and put to vote, was carried.

PRESIDENT: We have with us also to-night a gentleman who has in railroad work probably seen more practical service than most of us. He has been honored with the presidency of the American Railway Master Mechanics' Association, and has seen a lot of Club work and is always ready to talk. We would like to hear from him. Mr. J. H. Setchell.

MR. J. H. SETCHELL: Mr. President and Gentlemen: This is quite unexpected, and I am not a member of this Club; and coming from a gentleman who does everything else so well, it seems to me he ought to do most of the talking.

I had the pleasure of passing through the P. & L. E. shops to-day, and of course with a business view, and when I had gone through I said to the gentleman who is his associate as well as Mr. President, that I feared I would not be able to make any suggestions in the line of railway practice that would be an improvement on what I saw there, so far as I had examined it. And even the specialties with which I have the pleasure of dealing I doubt my ability to go into them so that I could improve on their practice.

But as the gentleman has suggested, I am old in railroad work. That is, I do not mean that I am old (you can see that I am not), but I am old in railroad work. And I have the honor of being about the only one of five members of the Master Mechanics' Association now living that joined the Association as early as the third annual meeting. That will be evidence that what I am saying is true. I joined the Master

Mechanics' Association at the third annual meeting in Pittsburgh at this very hotel, and for 18 years after the fourth annual meeting I was honored with the position of secretary, and for two years thereafter with the position of president. And in that time I have seen most every phase of railroad practice. I have seen it commence and grow up until we thought it had reached the height of perfection, when new men came on the ground and they proposed the questions we thought had been threshed over and over and over again and which appeared settled to manv of the older members, but it was found that the new ideas developed paid the Club and the Association for going over the subjects again.

And this has been my theory, that standards for railroad work had better not be adopted. And I took occasion when president of the Association at the Thousand Islands convention to say this to the organization, that the Master Mechanics' Association had never been an association of standards, but rather an association of examination. Never put up the bars, but always leave them open to adopt the best and anxious to find out what that is. Rather, our efforts should be concentrated in finding the best material and putting it together in the best possible manner. And to-day I think there is nothing that is so effective as the meeting together of the railroad men and discussing these particular questions. And the one thing that has added much to the interest of the Master Mechanics' Association has been the question box. The points of practical interest that come up and develop in a member's experience day by day, something that he has not seen before he brings to the attention of the Club, and finds that sometimes he is away behind and sometimes away ahead. As I illustrated to-day in talking to a gentleman, sometimes a man has been sitting on a railroad train and cars have been passing and he would suddenly think he was going, but by looking at the ground he could see that the other fellow was going and he was standing still. And so it is with every man in any department of railroad work who refuses to visit our Clubs and to avail himself of the knowledge that he can there obtain. The first thing he knows he will find himself standing still and the other fellow will be going.

I have been much interested in this question of automobiles, because I have a longing ambition to some time own an automobile. And the questions touched upon in the paper have brought the subject up in a form that my thoughts have followed. And I have appreciated the fact that the writer of this paper has stated that the great difficulty in automobile travel is the difficulty of steering. That is why it is so hard to make a man understand the great difficulty and danger attending the operation of the automobile. May this not be the reason? If I understand the gentleman, he predicts that automobile service for rapid transit through the country, perhaps, would be restricted because of that difficulty. But will not the time soon come when we will have better roads than we have now? I can remember years back when we had long stretches of plank roads upon which the automobile could operate much more easily than it does on even our best macadamized roads. Though we may not go to them again, may we not get the iron roads? I believe that if we had the help of the State and the co-operation of the good roads societies throughout the country that the time would come that instead of repairing our roads by farmers and others sitting on the fences and telling long stories and occasionally scraping the dirt that washes into the ditches on the streets to travel on and returns again by vehicles or the weather will be abandoned and that we shall have the co-operation of the State in paying a good portion of these taxes, and that our highways will be paved with iron, and we will be able to run automobiles at a very fair rate of speed, as well as to transport the product of the farmers through the country in a very much more economical way than we now do with wagons. Gentlemen, I thank you very much.

PRESIDENT TURNER: Now Dr. Milligan, we have returned the vote of thanks, and we would like to hear from you on behalf of the surgeons.

DR. J. D. MILLIGAN: Mr. President and gentlemen—I was so struck with something the gentleman who has just left the floor said that I could not help but take advantage of it. He said he hoped to live to see the day when he would own an automobile. I am frank when I say I hope to see the day when I own a railroad—but I couldn't buy a frog at the present time, so it is some distance away.

My first experience with the automobile was something like this: I was tired out, it was a cold night, I was at the hospital. A friend said to me: "I am so glad you are here. I will take you home. I have got an automobile." And out we ran, jumped into the vehicle—and he ran against the corner of the institution first. I said: "This is a good machine you have got." "Fine, yes." He backed around to get that wheel away from the building several times and lost a few minutes, but we got started. He took down around the streets and finally got up on the boulevard. By that time I felt that he was competent. He had caromed into everything by that time that was on the street. By the time we got to the boulevard I said to him: "Will it go up the hill?" Several times it had stopped, and he went to the front and it buzzed a few times—I don't understand anything about it, you know, but we finally got up on the boulevard and then we started. And I said: "Don't run too fast, I am not used to this." But he said there was no danger, that was not fast at all. But the telegraph poles began to disappear like lightning flashes and I said: "How long have you been running it?" "I never run it before myself." "Well," I said, "my life isn't insured heavily enough to stand such foolhardiness." Well he didn't hit the curb but twice then, and danced over to the other side. He said it was the fault of the lights. I said I think the fault is that the man behind the push hasn't got the range of the target, and if you will let me out I will walk home, because I have some respect for my carcass. I don't want to be killed that way. I want to be killed dead, I don't want to be tortured by premonition of what is coming. When I got home my wife reminded me that I was nervous, very nervous. No, I said, it is not nervousness; look at my hair. It was a cold night and my hair was all standing the wrong way, what was there, and I have noticed since that I am getting a little thin right there on top, which I never noticed before.

And I am happy to say that since that time I have not taken an automobile ride. But I am expecting my friend, Mr. Synnestvedt, who is a competent man, to take me out riding if he asks me.

But that is not the question I was asked to speak about. I have with me here some of our staff of the Lake Erie surgeons who are competent gentlemen to prescribe anything you need, to do unto you as would be done unto other good men, relieve your pains, your indigestion or any evil condition of the liver resulting from Thanksgiving. Any of us will be happy to do so—at so much per, or for sweet charity sake, as per schedule.

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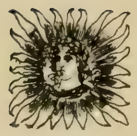

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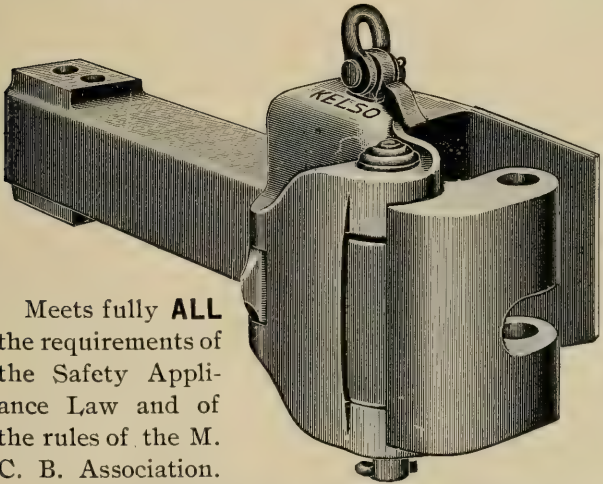

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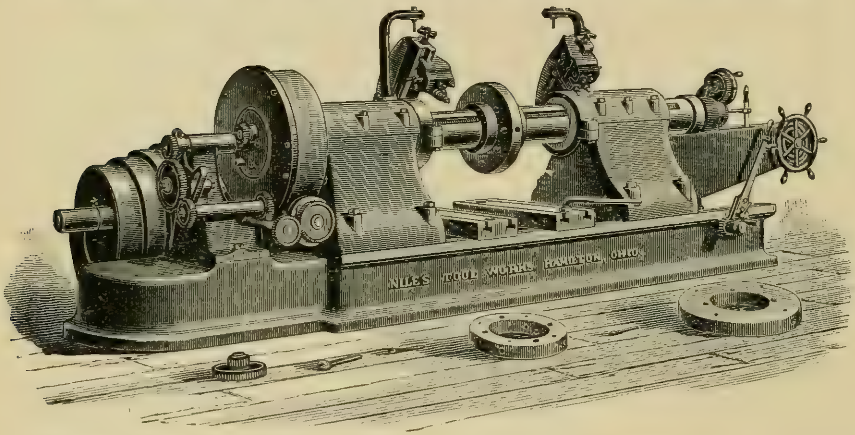
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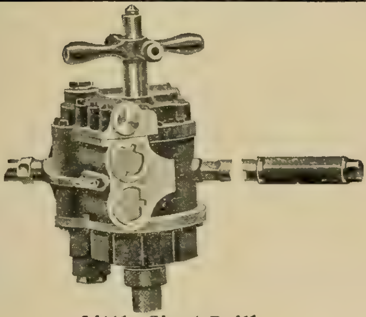

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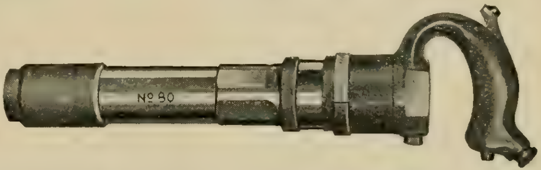

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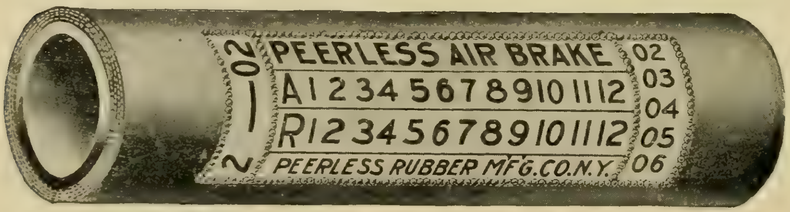
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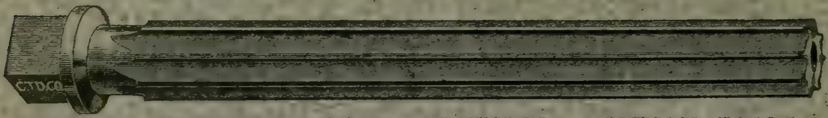

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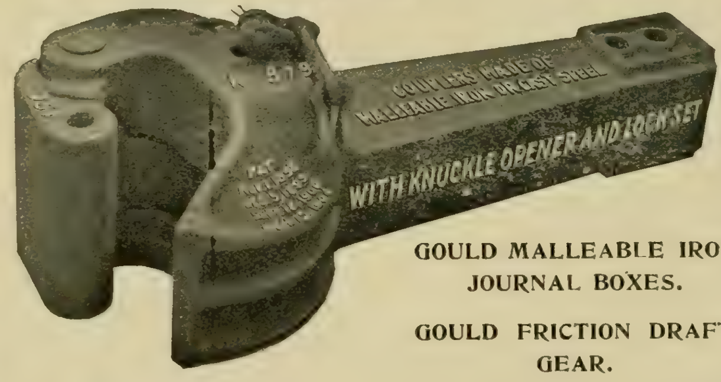
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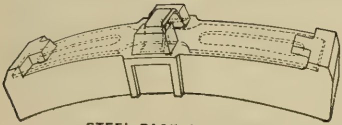

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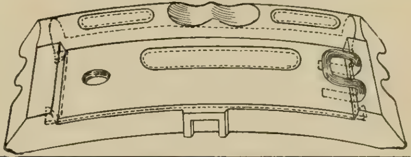

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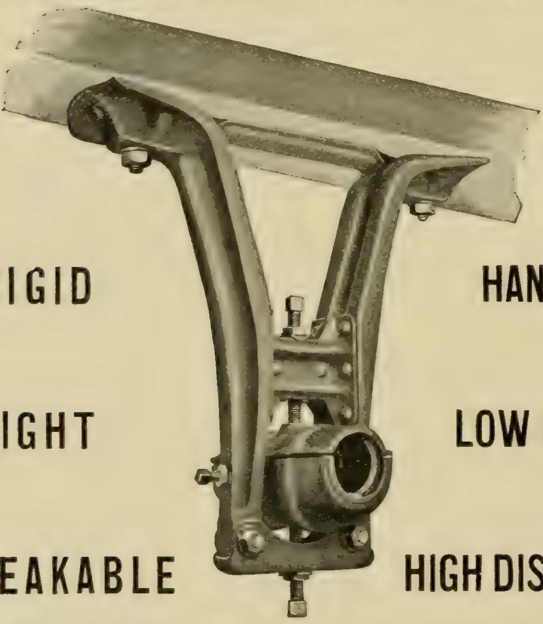

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OFFICIAL PROCEEDINGS

of the

Railway Club *of* Pittsburgh.

ORGANIZED OCTOBER 18, 1901.

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Supt. Motive Power, P. & L. E. R. R., Pittsburgh, Pa.

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Superintendent Transportation, P. & L. E. R. R., General Offices,
Pittsburgh, Pa.

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Superintendent Rolling Stock, Pittsburgh Coal Company, Coraopolis, Pa.

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Meetings held fourth Friday each month, except June, July and August.

PROCEEDINGS OF MEETING,

DECEMBER 23d, 1904.

The meeting was called to order at 8 o'clock, P. M., at the Monongahela House, Pittsburgh, Pa., with President L. H. Turner in the chair.

The following gentlemen registered:

MEMBERS.

Atwood, J. A.
Barnsley, George T.
Bell, W. K.
Bellows, A. B.
Blest, M. C.
Brand, Thomas.
Brooks, James B.
Brown, H. B.
Brown, John T.
Brown, W. R.
Conway, J. D.
Dambach, C. O.
Decker, O. S.
Ferguson, Oliver G.
Fox, J. B.
Gillespie, J. M.
Gray, Robert.
Grooms, J. C.
Hammond, O. J.
Horner, H. G.
Howe, David M.
Isler, C. J.
Jennings, F. R.
Kearney, Alex.
Keppel, A. M.
Kessler, D. D
Knight, E. A.
Laughlin, C. W.
Lee, L. A.
Lindstrom, Chas. A.
Lobez, P. L.
Lynn, Samuel.
Malloy, M. A.
Michel, Wm. J.
Milligan, John D., M. D.
McFeatters, F. R.
McIlwain, J. D.
McMullin, F. V.
Obey, G. B.
Palmer, C. A.
Porter, H. V.
Postlethwaite, C. E.
Redding, D. J.
Reeve, F. J.
Richardson, W. P.
Riley, J. W.
Scheck, H. G.
Schoonmaker, Colonel J. M.
Schuchman, F.
Stark, F. H.
Sweeley, G. P.
Taylor, H. G.
Terry, W. A.
Tucker, John L.
Turner, L. H.
Warnock, H. R.
Weigel, F. S.
Wendt, Edwin F.
Winneal, W. W.
Yohe, J. B.

VISITORS.

Alcutt, C. B.
Constans, L. H.
Belsterling, Charles S.
Diescher, Samuel.
Ebken, William J.
Greig, J. Howard.
Hamilton, T.
Hurd, D. F.
Kennedy, Fred H.
Kirk, T. S.
Ogden, George S.
Preston, H. M.
Roberts, John R.
Roberts, R.
Robinson, L. A.
Sattley, E. C.
Smith R. J.
Townsend, J. F.
Wardrop, J. W.
Whited, Willis.
Young, A. G.

President: The minutes of the last meeting being in the hands of the printer will stand approved as published, if there are no objections.

The following list of applicants for membership was read by Secretary Conway:

C. W. Cantrell, Sales Agent Herman H. Hettler Lumber Company, First National Bank Building, Pittsburg, Pa.

Frank Ditchfield, Assistant Chief Engineer, Pressed Steel Car Company, 30 Jackson Street, Bellevue, Pa.

F. C. Dunham, Special Sales Agent U. S. Metal and Manufacturing Company, 25 Broad Street, New York, N. Y.

R. E. Eggleston, General Manager Pullman Automatic Ventilator Company, York, Pa.

T. F. Gorman, General Foreman Erie Railroad Company, Youngstown, Ohio.

John K. Henry, Salesman Brown & Zortman Machine Company, No. 1 Wood Street, Pittsburg, Pa.

D. H. Kinter, Foreman Car Repairs, P. & L. E. R. R. Company, Glassport, Pa.

J. B. Rider, Chief Clerk Pressed Steel Car Company, Farmers Bank Building, Pittsburg, Pa.

J. H. Setchel, General Sales Manager Jerome & Elliott, 37 Canal Street, Chicago, Ill.

Albert Waycott, Vice President and General Manager, Damascus Brake Beam Company, St. Louis, Mo.

E. D. Comstock, General Passenger Agent, B. & L. E. R. R. Company, Carnegie Building, Pittsburg, Pa.

George D. Ogden, Division Freight Agent P. R. R. Company, Union Station, Pittsburg, Pa.

President:—As soon as these names have been favorably passed upon by the executive committee these gentlemen will become members.

I regret to have to announce the death of one of our members, Mr. James M. Ritchie, formerly purchasing agent of the P. B. & L. E. R. R. In accordance with the custom of this club I will appoint as a committee to draft suitable resolutions Messrs David M. Howe, O. J. Hammond and D. C. Noble.

It is the usual custom of the Railway Club to devote most of our labors to mechanical matters. This Club feels that it can extend its usefulness by considering all matters pertaining to practical railroading. This night has been set apart for traffic and transportation.

We have quite a number of the principal traffic and transportation men of the city with us to-night. Two things seem to have operated against us in the matter of attendance—the weather and the holidays; many of our members are not here.

The proceedings this evening will be opened by a gentleman representing an association organized for the purpose of advancing the interests of all business men, and the city as a whole. We will all be interested in hearing from the Manager and Secretary of the Merchants and Manufacturers Association, Mr. J. W. Wardrop.

Mr. J. W. Wardrop: Mr. President and Gentlemen—When the preliminaries were shuffled off so quickly, and I heard the minutes of the last meeting were in the hands of the printer, I was wishing that my speech was there, so that I might be out of the way and hear those who are to follow.

I am glad of the privilege of being present, and of the further privilege of saying something about the organization in which I am so much interested. And with your permission I will try to give you in a few minutes at least a short history of the organization and its relations to the railroads which you represent.

An invitation to sit with the Railway Club of the greatest traffic city of the world is a privilege coveted by many of our citizens, but to be invited to speak before the Club is both an honor and a pleasure, each graciously bestowed a la Pittsburg —and much appreciated by all who are thus favored, among the the least of whom is the one just introduced.

He is not only invited to speak, but furnished with a subject of double-headed significance, and then, like the rough unshapen stone, is placed first in the "hole" that marks out the foundation line of the evening's structure, there to bear the pressure of all that shall come after in the form of polished marble, these latter to give grace and beauty to the structure, over the capstone of which the President and Secretary inform us will later burn a "light lunch."

In presenting the subject I am not unmindful of the general makeup of my audience, and it is needless to say that for the fraternity I have much personal regard. I look upon you as friends—old and new—men of broad minds and capable of large things—critical yet sympathetic—each contributing to the progress and prosperity of this city, and with an interrogation point in each eye—the one for opportunities, the other for possibilities. It is in part answer to these interrogation points that I appear before you this evening to present the M. & M. and its relation to the railroads.

Pittsburg, in location and resources, is too well known to you gentlemen to require more than passing mention. Your presence here is perhaps the greatest compliment that could be paid to its importance, for not only have we the capable representatives of resident lines, but all of the important railway systems of the country. Pittsburg stands for large things. Pittsburg stands for Success. Pittsburg is the first City of Opportunity to-day, not only of America, but of the world. Millions have been, and millions more will be, invested because of these facts.

Pittsburgh to-day is the magnet, as well as the monarch of the industrial world. She is the study of men and of nations—the city that gives equally sure returns for capital and for capacity—the city of confidence and the city of character.

The M. & M. believes that Pittsburg is the best and greatest city on the globe, and, believing, dares to tell it everywhere. We tell it at home and we tell it abroad. At home, so that an apathetic people will become enthused and with pride we may point others to these and say "Ask the Man." Abroad, so that we may attract their attention, get them interested, cause them to investigate, come to our city and, like that other coined phrase, we say, "Look at the Map."

We are proud of our waterways and our railroads.

We look deeper than our smoke, and warm our enthusiasm at the fires of the furnaces that have made her fame worldwide.

We believe that she has resources vast and prolific in opportunity and possibility.

We believe that in her citizens we have energy, vigor and brains sufficient for a city ten times her size.

We believe that she is the manufacturing wonder of the world, that she has advantages far in excess of any other location, that these advantages should be brought to the attention of manufacturers, capitalists and investors everywhere, and we back up that belief by taking every opportunity to present these advantages.

We believe that she has possibilities as a market far beyond the fondest dream of past effort—that these possibilities may be developed—that her location means advantage and advantage must be brought home to tradesmen.

We believe that trade wants this market, and we want more trade.

We believe that trade is worth going after and are not too dignified to go.

We believe that Pittsburgh's hospitality is second to none, and seek to have it tested, therefore we invite tradesmen to our city.

We believe that a view of her parks, libraries, office buildings, beautiful residences, boulevards, club rooms, hotels and conservatories will be a revelation to our neighbors and friends, all of whom we invite to come and see.

We believe in progress—we advocate Greater Pittsburg, pneumatic mail tubes, sight-seeing touring cars, cheaper postage, reasonable insurance rates, closer relations with railroad management, just demurrage laws, stop-over privilege, merchants excursions from and to Pittsburg, interchangeable excess baggage books and increased transportation facilities.

Therefore, we believe in the necessity for early improvement in the Ohio river. We believe that the Lake Erie and Ohio River Ship Canal is not only a necessity to the preservation of Pittsburg's position in the commercial and industrial world, but, based upon the experience elsewhere, that this ship canal, with possible railroad facilities here, will solve the transportation problem.

We believe the spirit of Pittsburg looks ahead and loudly calls for this safeguard to our industries and commerce.

The promise of the Bessemer Railway was that it would meet all future demand for economic, prompt and efficient service for our manufacturers and that there would be no future necessity for the canal, but, after that road had been built, and before the ring of that promise had died in our ears, Pittsburg, through expanding trade, experienced the greatest congestion and industrial paralysis that ever visited the city and district, causing the shut down of our mills and working hardships from which we are just now recovering. The railroads are unable to supply the demand for cars so that our railroad facilities are not equal to the demands of to-day, to say nothing of the future. How can industrial and commercial Pittsburg grow and expand under these conditions?

Not only is this true, but there is present need of reduced transportation cost, since this is an important factor in cost of production, and it is by the latter that Pittsburg holds the supremacy of the world in manufacture. The combined needs of increased transportation facilities and decreased cost can never be expected under rail line conditions as they now exist, and we are forced to consider the waterways for the much needed relief.

As was clearly pointed out the other evening, the congestion of traffic on the railroads was the highest proof of the necessity for providing of the canal. The business of this section is increasing so rapidly that the railroads cannot ever hope to keep pace with it, and the future only holds out the promise of worse and frequent congestion of traffic. It is impossible to add in any way to the railroad facilities so as to obviate the trouble. The one way out is through the construction of the ship canal, which would do the work of 15 railroads, and at from one-sixth to one-eighth the cost. Already great industries which should have been located in Pittsburg have sought the lake front and there will be a steady procession of such in that direction and away from this city unless the needed transportation facilities are provided for by the canal.

The building of the canal would relieve the railroads of the heavy freight in ore and coal, which is the poorest paying, and give them instead a great increase in their light freight and passenger traffic, and the result would be that they would pay their stockholders much better than they do now. At the same time the merchants and manufacturers of the city would save many millions of dollars in freight, raw material would be much cheaer, and our industries would advance at a greater rate than ever. The need for the ship canal is pressing. Now is the accepted time for its construction, and immediate steps ought to be taken to commence the work of constructing it."

I would respectfully commend the unanswerable argument of our fellow-citizen, Mr. John E. Shaw, on the subject of this canal, to the careful study of every railroad man in Pittsburg. This argument is based on unquestioned facts and figures.

Pittsburg, in some sense at least, is in the position occupied by Manchester, England some years ago, and we may well profit by her experience and action. Information from most reliable source shows that: "Although the canal will have been in operation only 11 years on the first of next month, it is estimated that it has already saved to the merchants of the city its full cost in freights. In addition to that it has brought to the city many new industries, including one founded by Pittsburg capital which employs 10,000 men. Industries which had left the city also returned. The population of Manchester and Salford, which had fallen off nearly 60,000 during the few years prior to the inauguration of the canal project, has increased since then over 100,000. In three years after the canal began operations 13,000 new homes were erected, whereas in 1882 there had been many unoccupied ones in Manchester and Salford.

Unless Pittsburg builds the ship canal to Lake Erie, which will do the work of 15 railroads and cost not more than one it will before many years find itself in the plight of Manchester. Already it has lost large industries, which have located on the lake, but which would have come here had the canal been in operation. The continually recurring congestion of railroad traffic must invariably drive away business from Pittsburg and the high freight on raw material between the city and the lake will prevent the growth of our industries?"

The very life of Pittsburg's merchants, manufacturers and railroads depends upon a most careful study of these conditions. To the railroad man who fears the loss of revenue as a result of water transportation suggested, we say that the experience and record of every city, state and country bold enough to combine the rail and water transportation ideas are conclusive evidence that his fear is not based on fact.

Mr. M. E. Ingalls, President of the Big Four Railroad. said only last month, on the waterway question: "I am interested in railroads, but whatever helps transportation helps the public; there should be no opposition when the question is understood." This is also true in the reverse, for whatever helps the business public helps transportation."

"The building and operation of the proposed canal cannot fail to add largely to the business of the railroads. For every ton of heavy, so to speak, non-profitable or expensive freight which the canal will take from the railroads, it will return much more than an equivalent in lighter freight and passenger traffic, arising entirely from the operation of the canal. Actual experience justifies this assertion. The Great Western Railroad of England entered into competition with a canal, but desisted to its great profit, when it found it was using 58 per cent of its rolling stock to transport heavy freight, which brought in only 14 per cent of its income. The deepening of the River Main, in Germany, between Frankfort and Mayence, from 6 to 12 feet, was violently resisted by two railroads running along its banks. In two years after the completion of the improvement, the traffic on the river has increased 100 per cent and on the railroads there was an increase of 94 per cent, and the latter have been urging the further deepening of the river since their eyes have been opened. In France railroads only transport passengers and fast freight, leaving the carrying of raw material to the canals; and French railroads pay better than those of the United States or Great Britain. The New York Central Railroad runs along the Erie Canal, and has constantly paid large dividends. It may be remarked that the building of that canal was at once followed by the city of New York taking the lead of Philadelphia in growth. Properly conducted, canals act as large feeders to railroads by building up the country through which they pass, by furnishing cheaper raw material and thus enabling the establishment of manufacturers and the consequent great increase in passengers and the lighter but better paying freight traffic of the railroads."

We believe that sincere and positive co-operation between the merchants, manufacturers and railroads of Pittsburg is an immediate necessity to the continued prosperity and greatness of our city and cordially join hands with the Traffic Club in the stated object of its existence, i. e., " to promote good fellowship and close relationship between the steam transportation lines and industrial organizations in the Pittsburg district," and we heartily commend these principles to that inside relationship which must exist between the traffic and transportation departments of our railroads before the public will reap the benefit of so well intended principle.

Now, the greatness of Pittsburg, in opportunity, is the danger point in the commercial and industrial life of the city, for it sometimes leads to overconfidence, and overconfidence is the breeze from the enchanted land of self-satisfaction that lures on to fatal sleep from which some awake too late and others not at all. Who, then, is the watchman on this tower of strength and greatness? Who will rouse the people and warn them of this breeze? Who seeks this unremunerative position? Who will pace the walls of the city day and night and safeguard the city's commercial interests at his own expense? Gentlemen, you now anticipate me—I answer, the M. & M.

Civic pride and local partiotism may have seemed to be dead—yes, may have seemed to be laid away in the tomb, but at the loud cry of an awakened few these have come forth to live again, and, living, have assumed the role of watchman on the tower of opportunity, "to promote and protect the commercial interests of the greatest city on earth." There have been other organizations, there are other organizations, and far be it from me to criticise, but that loud cry and the life that came are the best and surest evidence of the need and we humbly trust that its deeds are ample justification of the call.

The M. & M. realizes that scattered effort is harmless and ineffective, and that only the organization of all in one sound body will give strength to purpose and yield permanent success.

It realizes that the promotion and protection of commercial interests, vast and numerous, means responsibility, and most cheerfully accepts this responsibility and pays the expense.

Our relation to the railroads is one of co-operation. What the traffic manager is to the individual concern the M. & M. is to the business interests of the city, even more than this, for, in a sense at least, it is the general traffic manager of the commerce of the city, to plan for its revenue, to promote its welfare, to secure the reward of its opportunities, to watch and develop its possibilities, to furnish its business life-blood and to insure its success.

We plan our work and work our plan for organization, systematic effort, educated enthusiasm, method, publicity, persistent advertising, a shoulder to shoulder advance. For such effort there must be sure reward.

As in railroading, so in commercial lines, there is the ever-present injunction "there are others." So, then, we come to the vital point—the market must first be secured—the railroad must secure the movement and the relation between the two must be co-operative.

The merchants and manufacturers are striving for the market and the market creates tonnage. If there were no tonnage you wouldn't be here. Your presence indicates tonnage. Tonnage indicates a trade center (mark you, I say "A," not "the"). Tonnage is a necessity to the life of each. "A" and not "the" trade center introduces the idea of competition. Competition means hustle, and hustle suggests four things aside from men—goods, prices, market and movement. These are the working tools of trade energy—anyone can destroy all so then their relationship is inseparable.

The first two are up to the Pittsburg merchants and manufacturers, the third is up to both, and the last is up to you.

Without co-operation all is lost.

It is for this reason that the M. & M. sets forth as an important principle "to co-operate with the transportation companies for the mutual benefit of all concerned, to aid them by every means in our power," and at your hands we seek this aid. This is our relationship.

I might go on and show that any failure on your part turns you into strong competitors, unintentional and indirectly, of course, but nevertheless harmful to our trade, but I will only add that when your traffic and transportation departments combine and work on the cardinal principle of "co-operation with the Merchants and Manufacturers" you will have gone a long way toward solving some of the difficulties of present day trade, and will have ushered in the experience of two rewards, viz.: less friction and more gain to both, and when that day comes, I speak for Pittsburg when I say HER market will be THE market, her tonnage will increase, your earnings and our earnings will increase, and Pittsburg will come to be recognized as "The commercial city without a rival," as she is now known to be and I trust will ever remain "Monarch of the industrial world."

President Turner:—Among the gentlemen who have kindly consented to talk to us to-night is one who has spent almost a lifetime in Pittsburg, who has seen long experience as a shipper, also as a railroad man. I will ask Colonel Schoonmaker to talk to us.

Colonel J. M. Schoonmaker: Mr. President and Gentlemen of the Railway Club—Your good president asked me some time ago if I would open the discussion that would follow the reading of the intensely interesting paper which we have heard at the hands of Mr. Wardrop. It is rather a difficult proposition, as you will readily understand, without knowing anything about what is in the paper until hearing it read. I asked him to excuse me, if it were possible, because of the volume of work I had on hand and the delicacy of the task of criticising anybody's paper, especially a paper that was as sincerely put before this meeting as Mr. Wardrop has done, and with the enthusiasm and interest and the whole-souled purpose that Mr. Wardrop has shown in every word.

Just before leaving my office this evening, my wife called me on the 'phone and wanted to know if I was going to the Railway Club meeting to-night. She said: "I see you are going to talk to the boys. Have you made any preparations?" I said I had not. That the only opportunity I had was a little time I was awake in the morning before getting up, and in thinking what might possibly interest them I fell asleep. Well, she said: "My dear, are you not a little afraid that under those conditions your audience will have the same experience to-night that you had this morning?" Now, boys, please do not go asleep, or I will be in a bad way when I get home.

Many of you know, doubtless, that Pittsburg is the place of my birth. My boyhod was spent here. What little education I had an opportunity to get was acquired here. I went from here into the army, came back and went to work and have been working pretty hard ever since. My experience has been somewhat varied, from that of a humble employee, beginning my work as a member of an engineering corps that had laid out the present Panhandle road between Pittsburg and Steubenville, at which time my father was a director of that road, and through the various industries that I have been more or less identified with in Pittsburg, particularly in the matter of transportation. One of my first ventures was on the river, river transportation, and after a time it was given to me to manage one of the largest concerns then operating traffic up and down the Ohio river, the very largest one. And I made a very careful study of questions of water transportation; during that time my associates in business honored me with the appointment and election to the presidency of the Pittsburg Coal Exchange, and at the head of that organization, made up of splendid, practical men, much good was accomplished. A whole winter was spent in a session of Congress to pass what is known as the Ohio River Bridge bill, to protect the then shipping interests against the encroachments of the railroads over bridges, where often, as in the case of the Parkersburg bridge, we had to pay $40,000 of our own money to get the piers widened so as to make navigation reasonably safe.

After leaving the river transportation business and concentrating my efforts in the field of Connellsville coke as being more productive and less hazardous—for there is no business today as hazardous as river transportation, the question of rail transportation was very earnestly impressed upon me. And with some of that enthusiasm which Mr. Wardrop has unmistakably demonstrated, I felt entirely satisfied that if I could get an opportunity to run one of these railroads in and out of Pittsburg I would show them how to run a railroad. I believed that better conditions could be had, and was firm in my belief.

During that period, the early 70's, traffic transportation conditions in Pittsburg were probably worse that at any time in the history of Pittsburg before or since. I don't know that I could give you any conception of the disadvantages under which the shipper in the Pittsburg district struggled from 1870 to 1875. The Connellsville coke business, in which I had then cast my lot, was forced to come down the B. & O. to Turtle Creek, taking a day in that service, and another day to transfer over a wooden trestle to the Pennsylvania at Turtle Creek; then another day to get from Turtle Creek to the city. The valleys were suffering for transportation, furnaces were out of coke, and the distress became great, even though panic times prevailed.

Conditions became so distressing that a prominent merchant stopped me down on the corner of one of the principal streets and getting into his buggy, he drove me down to his warehouse on Water street, taking me up into his office, where I found a dozen other gentlemen. Under sealed windows and doors the matter was discussed seriously of the construction of a railroad out of the Pittsburg district. It was given to Mr. Harry Oliver, on the part of the manufacturers, to see if it would be possible to get rights of way down through the mills from Jones & Laughlin's to Corks Run, and it was given to me to see whether it would be possible to get rights of way over the various rivermen's landing property. That meeting adjourned one at a time; one gentleman went out the front door, another out of the back door, to meet again at the call of Mr. Oliver and myself.

Four weeks after that time Mr. Oliver and myself called a meeting and we had on paper, rights of way from Jones & Laughlin's clear down to Corks Run, for nothing, if we would build a railroad within a given time. That was the inception of the P. & L. E. R. R.

To make a long story short, three years of the hardest kind of work was necessary to get the enterprise started, even under these favorable conditions. Times never were so hard. Money was scarce, banks were charging seven to ten per cent for interest, and nobody had any money. Our first endeavor was to find a contractor with enough faith in the outcome of the enterprise to take part of the securities of the road for his pay. After repeated efforts we succeeded in raising $1,162,000 of the $2,000,000 necessary to be paid into the treasury before we could issue our bonds, and we could not get another dollar from any source. And this little crowd met one afternoon and subscribed the balance of the money. We secured the stock, issued the bonds and began the construction of the Pittsburg & Lake Erie Railroad.

The fact of its proposed construction soon became known to the then management of the Pennsylvania Company. At that time all the transportation west of Pittsburg was in its hands. We were at once enveloped in criticism. The Pennsylvania people regarded the enterprise as unnecessary, and said that it could not possibly be constructed; that the men at the head of it could not construct a wheelbarrow route out to the valleys; that it would not pay if it were constructed; that a large amount of money would be lost and the Pennsylvania would have to take up the enterprise and carry another bankrupt road as it had the Cleveland & Pittsburg. These men were as sincere in that direction as Mr. Wardrop is in another. No more able man, or one who stands better in this community than Mr. William Stewart, president of the Allegheny National Bank, then general traffic manager of the Pennsylvania Company, went about this city and said it would be a great mistake to put money into this enterprise, that there was only one furnace along the entire line of the road and the road could not possibly be self-supporting. He was honest in all that he said, and those of you who knew him know that nobody to-day is held in higher respect in this city.

After having our stock subscribed, to prevent the many conditions we thought likely to arise before we finished, we caused a majority to be put into what we called a voting trust to prevent it being sold out or taken away from ourselves—and when I say "ourselves" I mean the men Mr. Wardrop has been speaking about to-night, the merchants and manufacturers, for they were the men who put their hands into their pockets and built the Pittsburg & Lake Erie Railroad And from that day to this, the majority of the stockholders of the Pittsburg & Lake Erie Railroad are probably as able business men as can be gathered together in any community They are well known to you.

When I was a shipper I thought that I could run the Pennsylvania Railroad better than the then management. But after I was called, unexpectedly, into the physical management of the Pittsburg & Lake Erie Railroad I found myself running up against conditions that altogether changed my notions. There is a shortage of cars to-day in the Pittsburg district, six months ago there was a surplus. In the carrying of merchandise conditions arise from time to time which require the same careful management that is necessary in any other industry to make it pay.

I do not want to be misunderstood when I state that I have not been in sympathy with the policy employed generally, and particularly on the Pittsburg & Lake Erie Railroad for years after I came in it, in a too conservative policy. Conservatism is all right; over-conservatism is all wrong in a railroad. We have all made to a greater or less extent, from a railroad standpoint, serious mistakes this year. With the depression of the trade in the early spring and winter there is not the shadow of a doubt in any mind that if the railroads had pursued the ordinary course and gone on with their improvements, built new cars, repaired their old ones, got their engines ready for conditions that were almost certain to follow this fall, traffic conditions in the Pittsburg district would not be as distressing as they are to-day.

Now a word for Mr. Wardrop and the discussion which I am supposed to make. I have asked your indulgence, because I want to lead up to what I want to say to Mr. Wardrop. Mr. Wardrop wants a committee. He can't get a better committee than the one represented on the Pittsburg & Lake Erie board.

Mr. Wardrop honestly thinks millennium is to come when we get the great ship canal built from Pittsburg to the lakes! I don't believe that. I believe it will be fraught with difficulties to-day as the proposition "On to Cairo" is. Let me give you my reasons for it. The watershed from which this canal is to be fed must necessarily be the highest point on the line of the canal. It can only come from a certain section of country. The railroads transporting traffic over this watershed have been hauling their water for their engines in two tanks to get over it. The navigation of the Ohio river contemplated was for a six foot channel. The proposition is now to increase it to nine feet. There are twenty vessels under construction to bring ore down from the docks of the upper lake ports. They will carry from 5,000 to 6,000 tons of ore and draw from 18 to 20 feet. How would you bring that vessel down to Pittsburg through a nine foot canal without unloading half of its cargo. If it has to be taken out the cheapest way to bring it to Pittsburg is to take it out of the vessel at the lake front and bring it here in cars.

I have studied the Ohio river carefully and believe that slack water navigation is practical from Pittsburg to the Ox Bows, about 18 miles below Louisville; beyond that I don't believe it is. I don't believe any intelligent engineer will say that the Ohio river can be slack watered beyond that because of the character of its banks and bed. These conditions are what we ought not to build false hopes on. I am in favor of water transportation and slack water navigation. I have been an enthusiast on it. When you consider that we can transport a ton of coal from Pittsburg to New Orleans for 60 cents we have the cheapest transportation in the world. Pittsburg as a commercial city—which Mr. Wardrop has spoken so kindly and enthusiastically about—is as limited as any other large city in the United States under certain trade conditions. Mr. Wardrop, with all his enthusiasm, cannot possibly claim that from a commercial standpoint Pittsburg can equal Chicago in the grain trade, or from an exporting standpoint can equal New York. The Almighty has been awfully good to Pittsburg. He has provided Pittsburg a fund of wealth in its coal measures inestimable in value. Millions of dollars have been spent in trying to develop some other theory than that in the economic manufacture of any commodity into which fuel enters largely into the cost of the product, the raw materials must come to the fuel measures.

Just so far as I can influence Mr. Wardrop, just so far as I can advise from a long personal experience without prejudice in any direction, I shall urge careful thought in any development that might disturb the conditions of Pittsburg which are so unique in themselves and have made broad development along lines where we get the greatest good for Pittsburg. It is a very interesting problem. I know from my relations to water transportation, as a manufacturer and as a banker, that we must be very careful and not let our enthusiasm run away with our judgment and common sense. Mr. Wardrop is doing good work. It is his people that built the Pittsburg & Lake Erie Railroad. It is his people to-day that can do more good as a rule for Pittsburg. And so far as we are concerned I know I do not speak only for myself, for they have already enjoyed the magnificent hospitality of the Baltimore & Ohio road, and both other lines expect to do their full share in this good work. Mr. Wardrop is doing good, but I am going to help him keep on the rails, because he will be like one of our big engines, if he gets off it will be a devil of a job to get him back on again.

President:—Among the manufacturers represented here to-night is the National Tube Works, represented by the traffic manager, Mr. Townsend.

Mr. J. F. Townsend: Mr. President and Gentlemen—I am very glad to be here to-night and wish to thank you for my friends in the steel business, but I would have been more thankful if Mr. Turner had not insisted upon a few remarks from me. However, I will proceed to make the best of this opportunity to get even and expose him before his associates.

I have known Mr. Turner by reputation for years and admired the really first-class rolling stock of the "Little Giant," for which he was given due credit. It was only very recently that I had the good fortune to meet and know the man, when the railroad men and steel men had a meeting in this city to consider changes in the revised rules for loading long material, we of the steel interests had everything our way, except one rule, and of course that we wanted changed above all others, it was 15-c, which has reference to tandum loads, loaded on top of sides of gondolas, and the revised rules fixed the limit at 30 inches sides for a 50 per cent capacity load to the car, and for sides under 40 inches only 25 per cent of the capacity, and cars with sides over 40 inches high must not be used at all for top loads. What did this mean, that the P. & L. E., Lake Shore, Erie, Wabash, B. & O. and B., R. & P. would have to go out of that line of business entirely, for they had no gondolas with 30 inch sides. I do not think it is necessary for me to attempt to advertise the railroad system that added over 9,000 gondolas with 30 inch sides to its equipment during the last two years, but it was very evident that that company guided the hand that made the very objectionable rule.

Well, the railroad men asked for more time and another meeting was held, but after several hours' discussion it looked as though the railroad committee had determined to "stand pat," for when the final vote was taken we were dumbfounded to see Mr. Turner hang his head and say, "I will stand by the committee," the case looked hopeless.

Within ten days he called me by telephone and told of a joint meeting held the day before in Buffalo between the Vanderbilt lines and Erie railroad, when it was decided amongst many other wise things to modify the top loading rule to permit cars of 53 inch sides loaded to 50 per cent of the capacity.

In other words, he had gone the M. C. B. committee 80 per cent more on sides that would take the half capacity load.

That is the kind of a man you have at the head of your organization, he is not "afraid of the cars."

I want to say right here that we of the steel companies are with you to a man, and the Railway Club will have our hearty support and co-operation ; the railroads' and shippers' interests are mutual and the best results can only be had by good team work, so let us pull together.

President:—It was my good fortune while meeting with Mr. Townsend and other members of the committee to form the acquantaince of their orator, and I know you will all enjoy hearing from him. Mr. Kirk, of Jones & Laughlin's.

Mr. T. S. Kirk: Mr. President and Gentlemen—I, like our friend the Colonel, must plead no preparation, but unlike him I have no fund of reminiscences to draw from. I am forced to say, were I to close my remarks by not beginning, you would all be more highly entertained.

Mr. Townsend has given voice to an experience that he and a number of others, including myself, had with a delegation of the Master Car Builders Association with special reference to the recommended rules formulated to govern the shipper in loading material, the product of our local manufacturers. These rules were drawn up and advanced by representatives of the Pennsylvania Railroad Company, subject to the approval of the allied representatives forming the Master Car Builders Association.

In these rules it was stipulated that material from its length, requiring two cars for its transportation, should be loaded on steel underframe gondolas with wooden sides and bottom. The sides not to exceed in height 30 inches. In fact, cars built only by the Pressed Steel Car Company. The Pennsylvania Railroad being the only line equipped with such cars, it necessarily followed we, as loaders, were restricted to this one line only. Happily by allying the Pittsburg & Lake Erie and the Baltimore & Ohio roads with the manufacturing interests we succeeded in having the rules modified, with the result we now enjoy the facilities offered by all of the lines entering our city, regardless of who the builder of their cars may be.

Our last meeting, specially arranged for, was for the purpose of visiting the National Tube Company works, located at McKeesport, where we were to receive practical demonstration as to the correct means for loading pipe. This effort was to be superintended by one of the authors of the rules and was on this account an experience greatly appreciated by we who had passed our lives governed only by what we are pleased to name practical common sense. The effort was doomed to failure owing to the latteral pressure exerted in loading without the use of what we know as dunnage, or strips of lumber placed between each layer of pipe. Before the process had reached beyond the experimental stage it was abandoned and the usual method, the experience of years, was re-established. A word in reference to the policy pursued by some of our railroads during the business depression just passed. It may not be within our province to criticize, but we think it indefensible that a corporation should allow its equipment to go to ruin when prudence would dictate it should be placed in good repair and held available for the intensified business activity sure to follow.

Our President, Mr. Turner, when he found his engine supply in excess of his needs, immediately turned his attention to retiring them. Before housing them, however, he repaired them thoroughly, so that when the day arrived for employing them the Pittsburg & Lake Erie was equipped for the gale and were able to care for any emergency. His foresight was not practiced by some and in consequence the tidal wave of business burst upon them all unprepared.

For occupying your time I offer my apology and thank you most sincerely for your patient courtesy.

President:—We have with us to-night among the traffic men the commercial agent of the Lake Shore and President of the Traffic Club of Pittsburg, Mr. D. F. Hurd.

Mr. D. F. Hurd: Mr. President and Gentlemen of the Railway Club and Guests—I told Mr. Turner that I would be out of place here. I thought so then and I know it now. I have been quite convinced in the remarks that have been made here by the merchants representative the industrial representative, the representative of the railroad and the man who superintends the loading of cars, that they all have troubles and can't get together, and then it is expected the traffic man will go about to get business. What show has he under such circumstances? Mr. Townsend very ably put one question that has been quite serious, but I do not see where it strikes us. He and these other industrial men claim that we don't give them cars, so what difference does it make what kind of lading they have to put in them?

Mr. Wardrop has presented a great many matters of interest this evening that deserve very great consideration, and he has very clearly put several before this organization and audience. But I think it ought to be shown that he is a man of men; he is all things to all men, and I would like to digress a moment to tell a little incident that shows how he is able to fit so well in different places.

One evening this week I had occasion to attend a dinner at which Mr. Wardrop also sat down, and he did justice to a very interesting menu. Later on he was called upon for some remarks, and I would like to have you decide whether or not he did justice to the occasion. He told this little story. "A Methodist minister read his resignation from the pulpit one morning, saying that he had accepted a call to the chaplaincy of Joliet penitentiary, and his reason for going were threefold. His audience, he was sure, did not love God; did not love one another and did not love him. They did not love God because none of them had died during the year he was connected there; they did not love each other because no one had been married, and they did not love him because his salary was still unpaid.

The minister, continuing with his service, made reference to a certain passage in the Bible—I am not certain that Mr. Wardrop was correct about that and I don't want to take any chances—I believe it was in John, "I go to prepare a place for you," and then he proceeded with his sermon. Now, gentlemen, if that does not show that the gentleman referred to is equal to any occasion, it will when I say to you that this remark was made before the Episcopal Church Club, of Pittsburg, and you can imagine how apropos that would be.

Like a majority of those connected with railroads for a period of years, it has been my fortune, or misfortune as one may look at it, to have been located at several different cities, and conditions are never alike in two cities. For instance, at Omaha for three years I spent most of my time trying to find somebody who had something to ship. I found him, and as there is no one here of those days to contradict me, and I will say that we did some business. But Omaha to-day is vastly different. Railroad interests have materially increased, and the country back of Omaha is in better shape. Then at Kansas City I saw railroad men struggling with the question, "How are we to get this fresh meat to the seaboard on passenger train schedule and only freight revenue," and sometimes it has been said that that was thin. Then they wanted the empty cars back in half the time probably on argument that weight was materially reduced. They had their troubles, but at the same time there is operating from Kansas City to the seaboard an excellent schedule for perishable freight.

Then comes Pittsburg. And when I arrived here I realized that there were shippers here who actually had 10,000 tons and even 25,000 ton lots and considered it a mere bagatelle. I settled down to take it easy. But I had not reckoned with the car supply. I found that I had the battle harder for cars in which to put the business than I had to hustle for business to put in the cars out West, only to find the same proposition unsolved day after day.

Transportation means a great deal to all of us, and some features have been pretty fully covered here to-night. It may have one meaning in one place and quite another elsewhere. In Pittsburg it has just one meaning; it means something that the shippers unanimously demand in greater quantity than the railroads are able to supply, either of cars or movement. Other localities have their troubles on this score from time to time, but with us it is one continual wail—first for cars, then for movement, then repeat.

But the railroads are not deaf to the entreaties or inactive as to the remedies. It is because of the magnitude of the requirements and the difficulty to acquire and continue to acquire facilities in keeping with the growing demands that the situation seems to be not relieved.

The usual remark on the situation is this, "Why don't you get more cars?" Gentlemen that will not solve the question. The railroads find it necessary to increase their equipment from year to year, and they do it to some extent. The evidence of that is in the daily papers, in the item that the car companies are running to their full capacity and new companies have been organized and are also full of orders. Somebody, therefore, is getting new cars, and we, in the natural order of things, must get some of them once in a while.

But it must be admitted that this is not the solution to the problem of our local troubles. I venture to say if 30,000 additional cars could be placed into commission in this district, available to-morrow, after they were loaded and forwarded, they would probably reach that dim and distant beyond where the only evidence of their existence is the per diem returns. When business is backward then the car comes back again into the yard of the owner as an evidence of capital invested bringing no returns. It seems to me that it is not the Pittsburg roads that need more cars, or at least not they alone. It seems to me that it is the other fellow, who often shows up on the record as doing business with our equipment; and the records do show this. This is not the whole trouble, but it is in a measure a feature of abuse and not use of equipment. More cars are needed, more locomotives, more terminals, but until our connections can take and handle our business freely, we are working single handed.

But compare the facilities of to-day with those of four years ago, and even the most dissatisfied will admit that vast improvements have been made at enormous expenditures and activity along these lines is never dormant.

However, improvement is not only to be realized from the big things or from those which mean the expenditure of large sums. Undoubtedly much more could be accomplished with the proper use of the facilities we possess—each interest being mindful of the other and working together. Co-operation means much in any work, and is no exception in our affairs, as we each exist by virtue of the other and progress in unison.

The operating department—the people who do things—or ought to—often look upon the traffic department as kickers equally as bad—or shall I say as good—as the shippers, but to that department let me say we are the fellows in between the two interests. The traffic department gets the business, and if you say that in Pittsburg the business comes of itself, because it is so enormous, let me suggest that you get ahead of us just once and make it necessary for us to go to work.

Now whenever we approach the traffic manager of the industrial company we try to convince him that we are all right, but the trouble is all with you.

When we compile our figures per day, week or any other period and compare them with other shipping centers, we do not swell up with importance, but on the contrary are depressed, because we think of those sad words, "What might have been," if only we had the cars and we count our losses not our gains.

Gentlemen, I realize that all these matters are old to you. There is nothing new that I have presented. I did not expect to. I accepted the task for the privilege of hearing the others, but the question is an important one, a very important one to the carrier as well as the shipper; nevertheless, the fact remains that each year our tonnage output exceeds that of the previous year and that of itself seems to indicate that facilities are increased by the railroads, showing the carrier is not unmindful of the situation nor in any way apathetic.

Colonel Schoonmaker, I think, gave us all good food for thought. He spoke of one or two matters that I feel a little interested in, particularly the question of crippled cars, that had not been repaired when the opportune time was here. I feel that there is no one who really appreciates what is required in Pittsburg quite as much as the people who come in contact with it every day. We are forced to know it. We can take our issue to headquarters, they will listen and say that it is all right and they are going to do it, but there are many things to be considered, and they are not all confined to any one point, nor are they of the same nature. But still, as has been pointed out, the shipper has been better taken care of than he has in years gone by, or how would he without increase of equipment increase his output?

One matter I had not intended to speak of, and that is the Traffic Club, of Pittsburg. We are not very large, only 140, and less than three years old. We were brought up on the bottle, and I will say that it was the water bottle, too. You gentlemen of the Railway Club handle the scientific side of it; we handle the practical. Not that you do not, but if it is not practical to meet together and enjoy a good dinner and fraternize, we do not know what it is to be practical. We think we have removed some of the obstacles, and have quit rubbing the fur the wrong way. We find where the club is a benefit in a great many ways, and it has certainly given opportunity for an acquaintance that could not otherwise have been obtained. We do not figure much in the annals of Pittsburg history, and we do not expect to. We lie quiet until the tocsin sounds for dinner and then gather around the board of plenty and good fellowship.

President Turner:—Before we take up the passenger side, there is one more traffic man we would like to hear from—Mr. W. A. Terry, General Freight Agent of the P. & L. E. R. R.

Mr. Terry:—Mr. Chairman and Gentlemen: I have been very much pleased at what Mr. Wardrop has said, and so well said, as well as what has been said and so well said by those who followed him. I believe, however, that the benefit of co-operation has already been extended to the people of Pittsburg by the railroads of Pittsburg in a marked degree. I do not suppose this co-operation has gone as far as it might, and believe that any organized effort is likely to produce additional advantages. I believe that the Merchants and Manufacturers Association will accomplish a great deal of good, not only for the industrial interests of Pittsburg, but for the railroads as well.

But organization, whether it is the Merchants and Manufacturers Association or whether it is the Traffic Club of Pittsburg, or whether it is among the railroads themselves—is bound to accomplish much good. It is the result of railroad organization that so much has been done to help in the development of this Pittsburg district, as well in fact as in traffic relations and in traffic matters in other districts.

I want to refer to one particular detail as an illustration of this, and that is the one pertaining to a question which is small, but the cause of an immense amount of trouble between the shipping public and the railroads, and that is the matter of freight claims. In the years gone by the railroads felt, or seemed to feel, that when a claim was presented the duty of the claim agent was to slide that claim over onto a connection or to have it fall into a pigeon hole, anything to have it get lost or buried if possible, and the shipper if he got his money in four or five years was very lucky.

At the same time, on the other hand, the shipper, not satisfied to present a claim upon a basis of invoice, thinking that was the best opportunity in the world to make a good sale, claimed not only the retail price, but something more if possible. That was the relation a few years ago. Under the organization accomplished by the railroads a claim to-day for any definite and known loss is paid immediately upon presentation. The shipper knows nothing about the details of the investigation, which comes afterwards, between the railroads.

Now that is the result of organization and of an effort on the part of the railroads to co-operate with the shippers. Now I want to read you a letter which I think is a step in advance, and I want to call Mr. Wardrop's attention to it as a very excellent step for him to take in suggesting a similar line of thought among the constituent members of his organization. This letter was written by one of the prominent shippers, and presents what I think is an equitable suggestion for the handling of claims.

"The correct way to obtain refund from the railroad or steamship company for shortage or damaged goods is as follows:

1st. Have your station agent make notation on your paid freight expense bill of the shortage or damaged goods.

2d. Write us for the original bill of lading covering the shipment, and be sure to refer us to the date of the invoice.

3rd. Advise us the amount and kind of items short or damaged, and we will forward you promptly a certified invoice covering same.

4th. Make a charge on your books against the transportation line for the shortage or damage at the cost price to you.

5th. Send a bill for the amount of your charge to your station agent, attaching to it the original bill of lading, the paid freight expense bill and the certified invoice, accompanying them with a letter, if an explanation seems necessary.

Always bear in mind the fact that as soon as a shipment made by us is received in good condition by the transportation line our responsibility ceases and the goods belong to you.

If all are not received by you, or if not in good condition, the carrier is responsible to you for your loss.

While at times the transportation company may appear slow in responding to your claim, it is because they have many such to investigate, but they pay all just claims."

I refer to this only as a single illustration of co-operation on the part of a shipper and an evidence of the possibility of closer co-operation in the future; for I do believe that among the greatest menaces to closer co-operation between shipper and carrier are the little, insignificant differences resulting from the unsatisfactory condition of claims and their adjustment. Now, if we could have on the part of shippers such a fair plan for presenting claims as is suggested in the letter just read, then I believe the carrier should stand ready to accept that fairness and meet it with co-operation; and the influence of such an organization as the Merchants and Manufacturers Association could accomplish wonders in bringing about such a sentiment among their members, and thus could the organized efforts of both manufacturers and railroads go hand in hand toward the greater development of the Pittsburg district.

President Turner:—All troubles in the passenger department in the way of stop-over privileges, excess baggage, etc., will be cleared up now by Mr. L. A. Robison, general passenger agent of the P. & L. E. R. R.

Mr. L. A. Robison:—Mr. Chairman and Gentlemen: I wish they might. I am inclined to lean toward Mr. Wardrop's position since reading that little book, "the Simple Life," in which Charles Wagner says: "Noble feelings, like great thoughts and deeds, are things of inspiration." For some time there has been a feeling among the railway people of this city of the needs of an organization, the object of which should be to keep abreast the industrial progress in the Pittsburg district, and through the agency of an association make known to the surrounding country the fact that other commodities than steel and iron are being manufactured and sold here more cheaply than can be done elsewhere, when, as if inspired, some of the younger merchants and manufacturers organized under the leadership of Mr. Wardrop, and the magic-like results have attracted the attention not only of other cities, but of the traffic officials of the leading railways of the country.

Recently while in Chicago I had the pleasure of talking with an expert traffic man who is director of the Harriman system, and about the first question he asked was what I knew about the Mrechants and Manufacturers Association down in Pittsburg that has been making so much noise. This impressed me so much that I began to consider "What is the relationship between the Merchants and Manufacturers Association and the traffic departments of the local railways?" First cousins seemed the correct relationship, but paternal forbidance changed the idea, because first cousins should not marry, and I am of the opinion that no smart traffic man can afford to lose any time in procuring a license that will closely relate him and his department with an organization like the M. & M.

In addition to the Railway Club, of Pittsburg, we have a Traffic Club, and I have wondered if the members of these two wide-awake bodies fully appreciate the possibilities for future industrial, mercantile and railway development through an auxiliary organization of the three, working together for the promotion of our commerce and the ideal upbuilding of our transportation facilities. Therefore as a business proposition, I suggest that some thought be given the question, and that we unite in advancing our natural advantages.

As far as the passenger department of our railroad or the other local lines is concerned, you will receive hearty co-operation without the asking. We are anxious to co-operate, and if Mr. Wardrop's association will take some definite step in starting this commission of which he speaks, I believe much good can be accomplished.

We already have an arrangement for step-over privileges in Pittsburg on through tourist tickets from western points to the eastern cities, including Pittsburg, but whether the arrangement has been as extensively or judiciously advertised as it merits I am not prepared to say. We have not a through line, but the condition is in effect, and if it has not been properly placed before the public, so far as this city's interests are concerned, I am sure the lines leading through to the east will co-operate heartily.

Therefore I suggest that some definite step be taken, perhaps to-night, if your organization feels so disposed, along the lines suggested by Mr. Wardrop. Certainly it is practical, and I know the gentleman will find the railroad people ready to further the project as soon as the association is willing.

President:—Mr. Wardrop will you close the discussion?

Mr. Wardrop:—As to the necessity for the canal, just a few things I want to say.

I presume everybody in the room knows that I think the railroad people, as a class, are the brightest and best people on the face of the earth. I do not mean officials only, but I include all, down even to the "men on top."

I know what you can do, and believe you capable of doing wonders, but I still believe that the railroads will never solve the transportation problems of Pittsburg, not because of any lack of brain or ability, but because nature has hemmed in Pittsburg so tightly that further development is somewhat hampered; therefore, I repeat that the waterways will have to be developed. The canal plan is entirely feasible, and that sufficient water may be had we have the highest engineering testimony in the United States; in fact it seems hardly necessary to say that there is water enough between Pittsburg and the great lakes to give us the Lake Erie and Ohio river ship canal. However, if any gentleman present will call at my office I will be pleased to hand out the two copies of the engineers' report I have referred to.

Now as to the suggested industrial commission (to be composed of two members from the Railway Club, operating men; two from the Traffic Club, i. e., one from traffic department of a railroad and the other a traffic man from some of the industrial concerns; two from the Pittsburg freight committee; two from the Pittsburg passenger committee, and two from the M. & M. Association, or from among the merchants of our city). Unless some steps are taken by the interests of Pittsburg, and I believe that the railroads of Pittsburg are all interested in its development, as much as any merchant or manufacturer, until some co-operation between them takes place, a more close co-operation than exists to-day, the advance of trade will be more than offset by the disadvantages of slow freight movement, and we will have repeated and multiplied from year to year the experience of the introduction and location of Lorain on the lake —Lorain belongs here if the city hall belongs here. I have been told that one contract was for 4,000 houses. Average these at five occupants each, with banks and stores in process of development, all of which ought to be here, turning trade into the markets of Pittsburg, giving us this natural increase and bringing Pittsburg into the place of importance our industry, experience and ability entitle us to.

The next point is—Increased facility and need of more cars.

Mr. Schoonmaker made an excellent point in his remarks—I did not dare to introduce it; in fact I did not come here to criticise the railroads nor to insinuate, but rather to shake hands at close range. The point is that of taking advantage of a slight depression to prepare for the next rising pulse of trade. What he said is so and there is no use going behind the bush to state it, but I want to say this—there has been twice as much money spent in and around Pittsburg in railroad improvement within the last three years (and not one additional railroad has been created) than would build two canals to Lake Erie. The Pennsylvania railroad is said to have spent seventy millions in this district within the past three years, while it is said on most excellent authority (men whose estimates were never exceeded in the actual amount of cost) that the canal can be built for thirty-three millions, and the facts should be sufficient to wake us up, and because I am for Pittsburg I am anxious that Pittsburg shall wake up.

Now I want to say to Col. Schoonmaker and to his able assistants that I take my hat off to them and to the policy of the P. & L. E., but, gentlemen, you know that the road is not a trans-continental line and that other roads in Pittsburg do not apply your methods or policy to their property.

To digress for a moment—take the subject of claims that has been hinted at to-night. I want to say to the credit of a certain gentleman in the room that when the writer presented a claim he was asked: "What do you want us to do with it?" The thing was so sudden he would not presume to answer. The result was that the claim was paid within twenty-four hours. I wish other roads would adopt that policy, but I know another railroad in Pittsburg which quoted a rate by phone and certified to same in a bill of lading, thus leading a certain merchant into contracting on the basis of the rate quoted. The merchant shipped his material, deducted charges on the basis of bill of lading rate, and when the goods were delivered the charges were figured on the basis of a higher rate. When the merchant put in his claim for the difference the railroad answered that the clerk who gave the rate in the first place, and who inserted it in the bill of lading, had made a mistake, and since they could not violate the interstate commerce law, they were compelled to respectfully decline the claim.

Now the shippers do not ask the railroads to violate any law, but they do ask and insist upon that railroad living up to its contract; in other words, they should pay for their mistake, and no law will be violated in doing so.

As I said before, I am not here to criticise, but if I were I could cite case after case, as instances of that kind come into my office every day.

Now, to the main question—shortage of cars is one of the least of the things that I use in my argument. The more cars you put into the Pittsburg district, under present conditions, the more congestion you will have. You cannot move the cars now here? Pittsburg is a plague spot whenever there is a boom in business—cars will not settle this thing. It is going to take other means, wider means, more extensive means, means that are equivalent to more than one additional railroad. For one-half the amount spent during the past three years, as previously explained, the canal could have been built and it would have been equivalent, according to well estimated figures, to fifteen additional railroads in and out of Pittsburg, and I have made quotations in this paper, which paper your secretary can have if he wants it, showing that a railroad which had originally put obstacles in the way of a projected canal, got down to figures and found that 58 per cent of its equipment was used in moving freight that yielded less than 14 per cent of its revenue, and finally made an appropriation in favor of the canal. Also, in Germany, two railroads running along the proposed route of a canal, objected to said canal. The roads were finally persuaded to keep quiet and let the canal be built. The result was that in two years the canal movement had increased 100 per cent, and the two railroads that had opposed it found that their revenues had increased 94 per cent.

Gentlemen, this subject of the canal is worth taking a square look at, and now I am coming to you. You can help us. You must help yourselves, if you please, by helping the business interests, for if they go down, you will go down.

My friend has referred to a certain gentleman whom he met in another city recently, a gentleman of large railroad experience and influence, whose first question was about the M. & M. Association of Pittsburg. I know the gentleman referred to, and wish to say that the city in question has got its eye on Pittsburg more than we are aware. Within the past thirty days, that city held a meeting at which were present 800 of the best business men of the place, and you never heard of greater enthusiasm in your life. And what for? To profit by the congested traffic conditions in Pittsburg and to secure some of the trade that surrounds us and belongs here. Do you not believe that it is time to wake up?

This has been a charming evening to me. I have enjoyed every minute and appreciate the kindly criticism that has been made, and I trust that we will profit by it. Certainly, as between us, there is nothing to hide. We want to know the facts, and be governed accordingly.

You have no doubt heard of the man whose mother-in-law was sick, so sick that when the doctor came out of the room he said to the man: "Well, Bill, I have no hopes of your mother-in-law. She is very sick, and will certainly have to be sent to a warmer climate." About half an hour later the son-in-law came in with an axe in his hand, and, walking up to the doctor as meek and mild as you please, he whispered: "Doc, you will have to hit her, I can't."

Mr. Chas. A. Lindstrom:—May I say just a word? There seems to have been a good many things said to-night about the rules of loading long material. I wish to give you a little history of how those rules originated. Away back in 1894 and 1895, before ever any steel cars were built in this country, there was a great deal of structural material to be shipped in twin and triple loads. The material had to be loaded on the old wooden cars, and the Pennsylvania railroad, with which I was then connected, had a good deal of trouble from broken down sides and things of that kind. I was connected with the engineering department and was instructed to go out and investigate and make a report, and, if possible, prepare rules to be presented to the Master Car Builders' Association for adoption. During 1895 I went to every mill in this country from St. Louis east investigating conditions, noted the condition of the cars then in existence and prepared the rules which at the convention at Saratoga in 1896 I laid before them. Mr. Pulaski Leeds, who was then superintendent of motive power of the Louisville & Nashville, was chairman of the committee on rules for loading long lumber and structural material, and to him I presented my report. He got up before the committee and said: "Gentlemen, Mr. Lindstrom, of the Pennsylvania Railroad, has presented rules for loading structural material, etc., that are so comprehensive that I ask you not to read them, but that we adopt them without being read, as they stand," and if you will refer to the proceeding of the M. C. B. Association for 1896 you will find that record.

That was before steel cars were ever thought of. At that time a gondola was 30 inches high and a coal car 50 inches high. I prepared the limits of what these cars should carry, not only for the safety of the cars, but also for the safety of the public. When later steel cars came into use, the Pennsylvania Railroad observed that it was not profitable to carry such light loads, and conditions were changed to meet the new cars.

Mr. Kiesel, who has been blamed for certain things, succeeded me in looking after these rules, and what he has done I am not entirely acquainted with, but I am sure that the old road with which I was connected for so many years had no such motive in mind as to absorb the whole business in the district for these steel cars, but to take care of the business that was given them in a profitable manner to themselves as well as to the safety of the public.

Mr. F. H. Stark:—Surely this has been an enjoyable evening. We have seen the lion and the lamb lie down together. We have had what we might term a heart-to-heart talk, and surely there should be good come from this conference. On behalf of the Railway club, of Pittsburg, I desire to make a motion, that we extend to the gentlemen, who have so edified and instructed us our appreciation for their coming here, and that we manifest this by a rising vote of thanks.

The motion prevailed by unanimous vote.

Colonel J. M. Schoonmaker:—I want to have a little heart-to-heart talk with our friend, Mr. Wardrop, as to my remarks, in relation to the ship canal. I spoke along the line of the possibilities and the difficulties that presented themselves in that direction, as well as every other direction. Mr. Wardrop has invited all of us to come to his office and read the reports of engineers, which will be conclusive to everybody, that there will be ample water for all possible conditions. I read those reports years before Mr. Wardrop ever saw them. The man that made them sat at the desk with me at school and we talked them over before being made.

I am going to make a suggestion to Mr. Wardrop, that he and I go and see that man to-morrow, and if he does not agree with me, that if the ship canal had been built at the time, and in the manner, in which he proposed it, and it was in use the first day of January, 1904, there would not be a drop of water in it to-day.

Mr. Wardrop:—I must take Mr. Schoonmaker up on that. If there is such a possibility as no water, everybody should know it quick, for we expect that the corporation that will introduce the canal, will be formed, even before Congress grants the power, and we also expect that the next Congress, after this one, will grant that power, and I am quite sure that I do not want to go around Pittsburg stating things that are not based on absolute fact. I trust my information is correct, but I will be the first in Pittsburg to withdraw anything I have said, just the first moment I know that I have been misled in the statement. I have the engineers' report in my office, two copies ot it. I also have access to additional information that is now in press. You are welcome to this information. I will be very sorry if Pittsburg is to be, in any way, shape or form, placed in the position of not having sufficient water to get between here and the lakes, and, as long as the lakes remain where they are, I must repeat, on the information I have from most reliable sources, that we need have no fear on the canal question, so far as water supply is concerned.

Colonel J. M. Schoonmaker:—I only refer to this year, as representing a condition of affairs to-day unparalleled and unknown in the history of Pittsburg, which may never be repeated. Everybody knows that they are not matters of yearly occurrence. Everybody knows that the conditions on the Pennsylvania railroad to-day, under which 32 trains are hauling water every day to Altoona and that section, never were known before in the history of the Pennsylvania railroad, and may never be known again. Understand me, I speak only of the conditions of this year and this moment.

Mr. J. F. Townsend:—I want to correct the impression that I was criticising the Pennsylvania railroad. It was very far from my mind to think that the Pennsylvania railroad would be so small as to think it could corral the business of Pittsburg, by designing cars and restricting loading that would secure the business. The harm occurred in this way, that a man at Altoona undertook to prepare rules for cars that the Pennsylvania railroad owned and the only road in this country that had such equipment, and these rules were going out broadcast throughout the country, and when a load would start from Pittsburg and get to a remote junction point what was the result? The car inspector had the M. C. B. rules, "and they are his bible," and naturally that load had to be altered. And if you misunderstood my remarks, I want to correct that impression.

There being no further business, on motion, adjourned.

James McFadden Ritchie.

Whereas; It has pleased our Heavenly Father to remove from our midst, our late friend and associate James McFadden Ritchie, therefore be it,

Resolved; By the Railway Club of Pittsburgh, of which he was an honored member, that we deeply deplore his demise, and extend to his bereaved family and relatives our sincere sympathy in their sad affliction and mourn with them in their irreparable loss, and be it further,

Resolved; That these resolutions be spread upon the minutes of this Club and a copy of the same be sent to his family.

DAVID M. HOWE,
D. C. NOBLE,
O. J. HAMMOND,
} Committee.

EDWARD KERR, President. W. R. BROWN, Supt. G. W. GOSSER, Sec'y and Treas.

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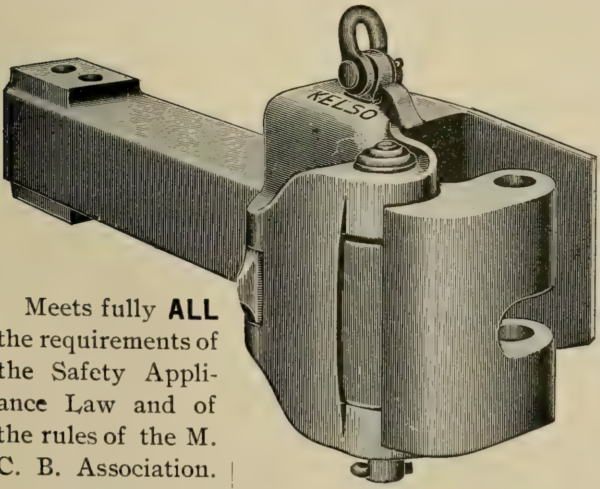

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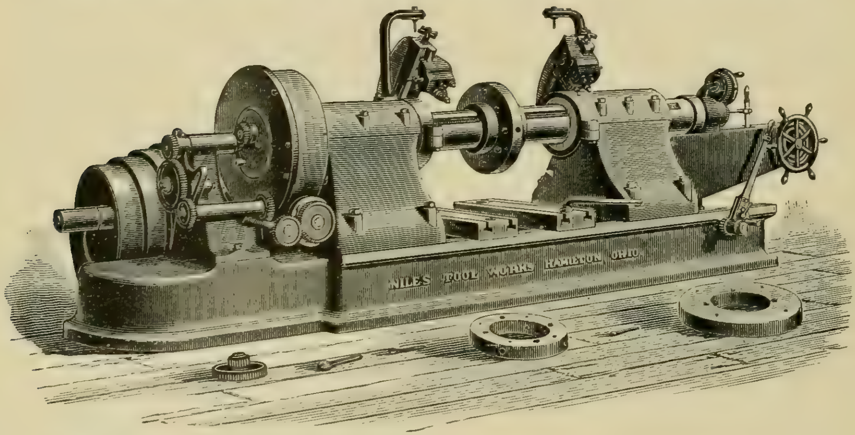
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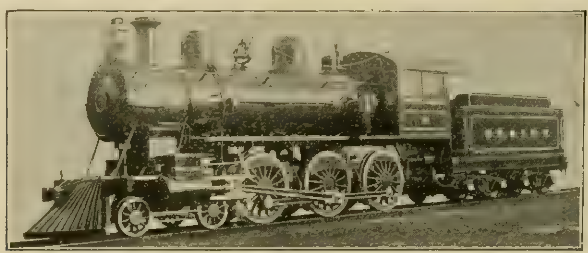

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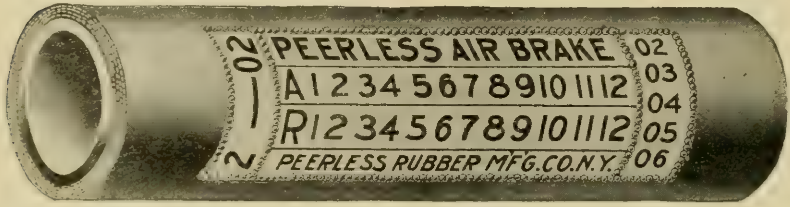

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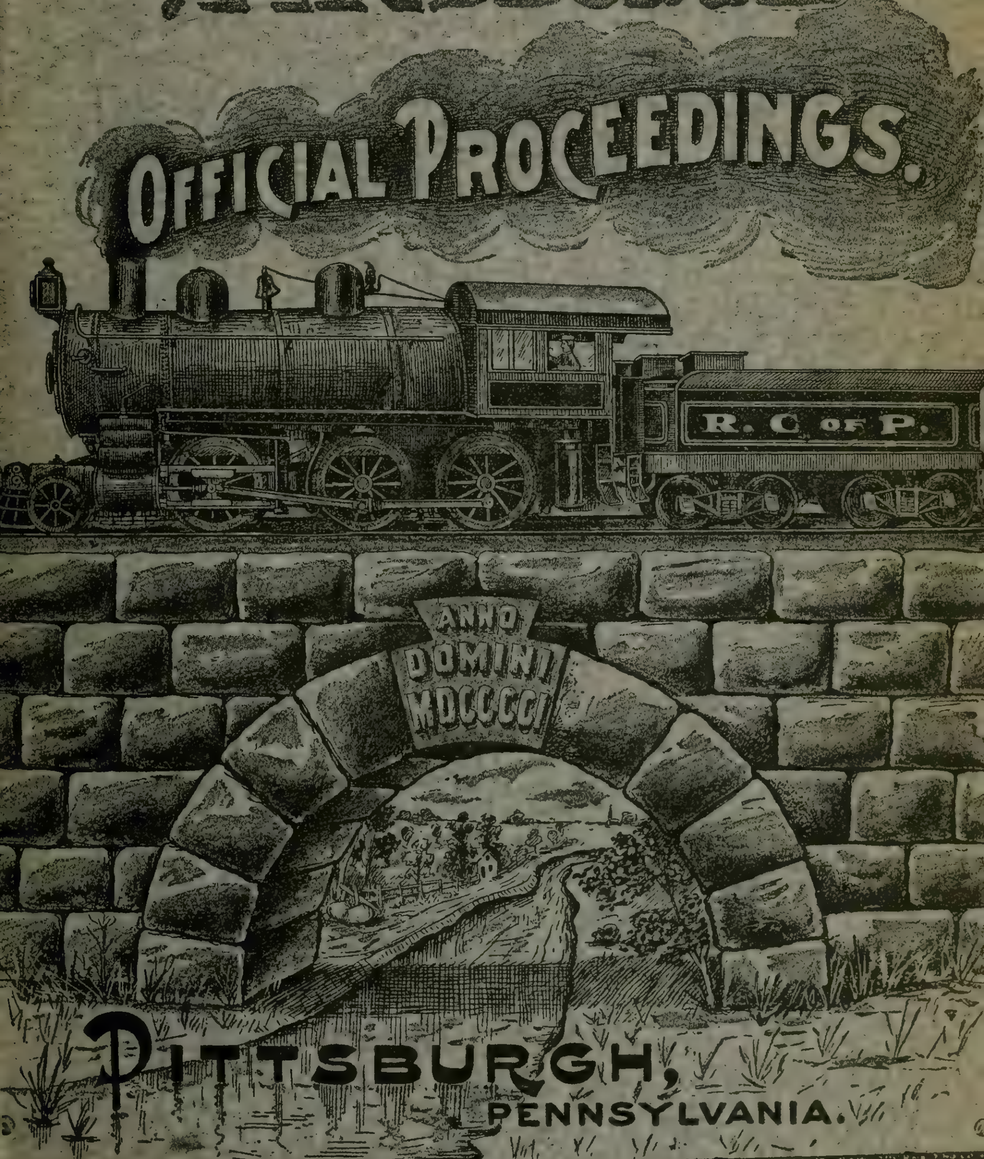

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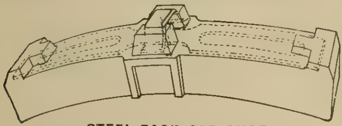

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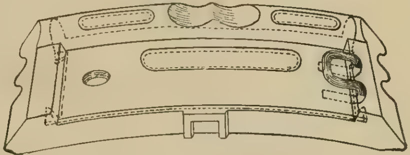

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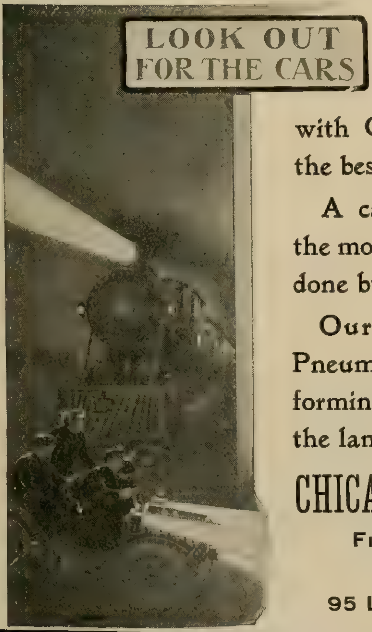

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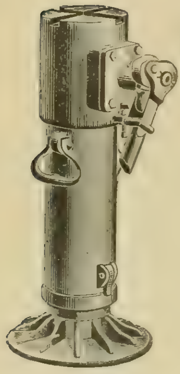

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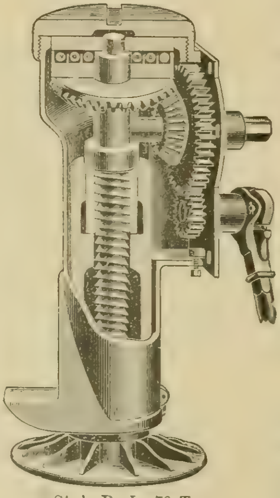

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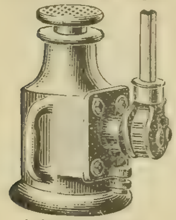

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OFFICIAL PROCEEDINGS

of the

Railway Club *of* Pittsburgh.

ORGANIZED OCTOBER 18, 1901.

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Supt. Motive Power, P. & L. E. R. R., Pittsburgh, Pa.

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Supt. Motive Power, B. & O. R. R. Co.
Pittsburgh, Pa.

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C. L. GIST,
Superintendent Transportation, P. & L. E. R. R., General Offices,
Pittsburgh, Pa.

F. H. STARK,
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J. D. Conway, Secretary, General Offices P. & L. E. R. R., Pittsburgh, Pa.

Meetings held fourth Friday each month, except June, July and August.

PROCEEDINGS OF MEETING,

JANUARY 27th, 1905.

The meeting was called to order at 8 o'clock, P. M., at the Monongahela House, Pittsburgh, Pa., with President L. H. Turner in the chair.

The following gentlemen registered:

MEMBERS PRESENT JANUARY 27, 1905.

Anderson, H. T.
Ayers, H. B.
Barnsley, Geo. T.
Bell, W. K.
Brown, E. W.
Brown, H. B.
Coates, H. T., Jr.
Connolly, W. E.
Conway, J. D.
Cottrell, W.
Crawford, D. F.
Crouch, A. W.
Decker, Omar S.
Dyer, J.
Elmer, Wm. Jr.
Foller, Chas. S.
Ford, D. W.
Fox, J. B.
Gearhart, J. A.
Gilbert, E. B.
Grove, E. M.
Hastings, C. L.
Haynes, Jno. E.
Hood, D. G.
Horner, H. G.
Horner, Jas.
Hubbell, Ira C.
Jennings, F. R.
Johnson, C. S.
Kearney, Alex.
Kerr, Geo. M.
Knight, E. A.
Korba, W. J.
Krause, Julius.
Lawson, Sherman S.
Lindstrom, Chas. A.
Lobez, P. L.
Long, R. M.
Malloy, M.
Mason, Stephen C.
Michel, Wm. J.
Miller, O.
McKee, F. E.
McKee, S. Frank.
McMullin, F. V.
McNulty, F. M.
McVicar, G. E.
Nickel, J. K
Obey, G. B.
Peach, W. M.
Porter, H. V.
Postlethwaite, C. E.
Prendergast, J. F.
Redding, D. J.
Sherman, C. W.
Shuck, Wm. C.
Slocum, A. W
Smith, D. W.
Spangler, C. P.
Sproat, H. H.
Stark, B. F.
Stucki, A.
Sumner, Eliot.
Suydam, R. S.
Tracy, M. S.
Turner, L. H.
Warnock, H. R.
Wilson, W. J.

VISITORS.

Allfree, E. H.
Battenhouse, Jno.
Platt, J. G.
Riddle, Walther.

Bole, Wm. A.
Branson, C. R.
Diescher, Samuel.
Haney, John.
Jones, P. C.
Kendig, R. B.
Maury, Geo. P
Maw, F. R.
Patterson, C. C.
Peck, C. D.
Ringer, L. H.
Rowand, W. H.
Schatz, F. C.
Sellers, C. E.
Shinn, Jos. A.
Stafford, B. E. D.
Whited, Willis.
Whyte, F. M.
Wilson, J. W.

PRESIDENT: The first order of business should be the reading of the minutes of the last meeting. But they are in the hands of the printer, and if there are no objections they will stand approved.

Secretary J. D. Conway then read the list of proposals for membership, as follows:

Harry L. Allen, Asst. District Manager, American Steel Foundries, Alliance, Ohio.

Frans Engstrom, Civil Engineer, American Bridge Co., Ambridge, Pa.

E. E. Forgeus, Purchasing Agent, Pressed Steel Car Co., McKees Rocks, Pa.

C. W. Hall, Foreman Locomotive Repairs, Pennsylvania Company, Allegheny, Pa.

J. W. Henderson, Superintendent, Central Car Wheel Co., McKees Rocks, Pa.

G. C. Lambe, Asst. Engineer, Engineering Department, Pressed Steel Car Co., McKees Rocks, Pa.

Wm. Milligan, General Foreman, Pressed Steel Car Co., 3640 Fleming Ave., Allegheny, Pa.

Frank Moore, President, Pittsburgh Brake Shoe Co., Farmers Bank Building, Pittsburgh, Pa.

E. C. Sattley, Traffic Manager, Page Woven Wire Fence Co., Monessen, Pa.

Wm. T. Schornberg, Blacksmith Foreman, Pennsylvania Company, 1217 Buena Vista St., Allegheny, Pa.

F. A. Skelton, Asst. Auditor, Pressed Steel Car Co., Farmers Bank Building, Pittsburgh, Pa.

T. F. Van Kirk, Supt. Aliquippa Park, P. & L. E. R. R. Co., Coraopolis, Pa.

O. F. Transue, Genl. Mgr. The Transue & Williams Co., Alliance, Ohio.

Frank F. Weston, Sales Agent New Jersey Tube Co., Newark, N J.

PRESIDENT: As soon as these names have been favorably passed upon by the Executive Committee the gentlemen will become members of the Club.

Under the order of Communications the Secretary read the following:

THE MASTER CAR BUILDERS' ASSOCIATION.
Office of Secretary, Chicago, Ill., January 11, 1905.

J. D. Conway, Esq.,
Secretary Railway Club of Pittsburgh,
Pittsburgh, Pennsylvania.

Dear Sir:—

The Arbitration Committee will probably hold a meeting the last of April or the first of May to prepare its report on Revision of the Rules of Interchange. If you can make it convenient to do so I would be glad to have the recommendations of your Club in this office as promptly as possible after the April meeting in order that the Arbitration Committee may give them consideration when preparing its report.

Yours truly,
JOS. W. TAYLOR,
Secretary.

PRESIDENT: The communication will be referred to the Chairman of the Committee on M. C. B. Rules and Prices.

There has been a little work done with a view of commencing a movement to merge, to a certain extent, the Engineers Society of Western Pennsylvania, the Traffic Club of Pittsburgh, the Foundrymen's Association and the Railway Club of Pittsburgh. Some of the members of the Engineers Society are here to-night and we would like to have a little informal discussion upon the subject, and I would call upon Mr. Diescher, president of the Engineers Society, for his views.

MR. SAML. DIESCHER: Mr. President—So far, the question of looking for other quarters has not been brought up yet for a formal discussion in our society. However, we are so situated that we shall have to consider it seriously before long, and for several reasons. One is that our lease expires by April next year, and we don't know whether or not the house will then be let again on the same terms as in our present agreement. The other reason is that we have not so much room there as we should have in order to fully satisfy the purpose of our organization, that is, to afford its members a place where they could, any time during the day and evening, avail themselves of our reference library which, owing to lack of space, is stored away in boxes and piled in a small room that does not afford access to those books. Thus, you see, we must make a move toward securing proper quarters and must get them at a price that is in keeping with our income.

To rent a building that would suit our purpose and to be used entirely by our society would most likely cost more than we feel justified to pay. But if your two societies and ours would join issues in regard to the renting of quarters, that is to say, each securing what room it may need for any special purpose, and all to use one and the same hall for meetings, very satisfactory quarters might be secured at a comparatively small rent.

It seems this matter could be expedited by appointing a joint committee consisting of an equal number of members from each of the three societies interested, which committee should meet as soon as practicable and see what can be done, and then report home and get further instructions.

PRESIDENT: I think I see Mr. Ashworth. We would like to hear from him.

MR. DANIEL ASHWORTH: Mr. Chairman—This is entirely new to me. I have not been in touch with the Society in regard to its business matters for quite a while. My colleague Mr. Fred Schatz is chairman of the House Committee and can very effectively take my place.

I will just simply say this in generalization, that it seems to me that any city in the Union should have a first-class place where three such societies would have a place to meet with ample opportunity for growth and development. Looking at it briefly, as I have just this moment, I take it that it would be a very simple process to have a magnificent department in which there would be committee rooms, ample space for libraries, for the societies, and a general hall for the development and growth of these three scientific bodies, which can meet at their stated times, each one revolving in its own sphere, and yet so close in touch that it makes a harmonious whole and brings about a thorough, first-class development.

I believe my colleague can take up the details where I can not to-night. I think it is a proper thing to do and I am heartily in favor of it.

PRESIDENT: We would like to hear from Mr. Schatz.

MR. FREDERICK C. SCHATZ: The information I have would not be at all interesting. However, I have been figuring out what our needs are and what we can afford to spend, judging from our past receipts, and that will all come in after this committee has got to work. Mr. Diescher has covered the ground fully.

PRESIDENT: We would like to hear from Mr. Bole.

MR. WM. A. BOLE: I haven't much to say. Mr. Diescher privately stated to three or four members of the Engineers Society who happened to be in a group here a few moments ago that a new hotel was being built at the corner of Penn Avenue and Tenth Street, and somebody had spoken to the proprietor and the proprietor had expressed a willingness to so build his hotel as to have a large audience room and quarters appropriate for such purposes.

Now the Engineers Society has had a house at No. 410 Penn Avenue for seven or eight years back, and have been paying a pretty high rent. We only use our auditorium once a month, the Sections using it perhaps a little oftener. As I said a few moments ago to Mr. Diescher, as engineers are always striving for efficiency, it does not seem efficient to hire a house and only use it once a month. For the same amount of money, participating with other societies, it might be possible to have a very much more comfortable and commodious place. If your hotel proprietor is enterprising enough to hunt us up and provide for our needs, and will enter into a suitable lease for a suitable length of time, it might make a very desirable arrangement.

Our books are going to ruin, they tell me, in the Engineers Society. I haven't seen any of these books for some years.

One of the things which tend to the upgrowth of the Society is the social feature. If we had something of a more social nature than heretofore it would tend to promote good fellowship and larger usefulness. Frequently members of our society meet together by appointment and have dinner together before we go to the society's rooms. Some very pleasant occasions of that nature have been had, and I, for one, as a member of the Engineers Society, would be heartily in favor of such a move. We could get more for our money, and we would get better value than in the past.

PRESIDENT: Mr. Barnsley is a member of both associations, and I will ask him to offer a resolution in order to get the matter before the meeting.

MR. GEORGE T. BARNSLEY: As a member of both organizations I would be very glad to lend a shoulder to bring about the result which would be in keeping with such a desirable end. Without going into the matter at all, for I think the ground has been pretty well covered, I want to call attention to one fact, and that is the social feature of any organization. It is not worth while to ask men to meet once a month or oftener and talk over some dry formula. Get them together and take up some live subject, and enliven their personal points by something social, after a reasonable amount of time has been spent on the scientific end of it. And that means that you must have quarters wherewith you can do something in the club line. If a meeting is called to order at eight o'clock the practical thing is to adjourn at ten o'clock and spend the rest of the evening together in a social way. Have a light luncheon served and occasionally some entertainment. The members are thus drawn together and they lose no opportunity in becoming good fellows and at the same time sharpening their wits in a scientific way.

I have come in a little late to hear all the discussion, but my idea would be to have each organization appoint a small committee to confer with like committees from the other societies and go into this matter in detail as Mr. Diescher and others have suggested, and make a report, because it is something that will take some time to get the matter formulated, so as to put it on a practical basis.

In order to start it I would make a motion that the Railway Club appoint a committee of say five members to meet with similar committees from the other organizations and take the preliminary steps toward this end.

A motion to amend, that the committee of five be appointed by the Chair, is accepted by the mover of the motion and incorporated in his motion.

MR. WM. A. BOLE: I do not understand that this proposition is for the merging of the societies into one?

PRESIDENT: Each society would maintain its own identity, but merge only so far as related to a permanent meeting place.

MR. BOLE: Simply to get together in the matter of obtaining suitable quarters, each society to remain independent as it is now?

PRESIDENT: Yes, each organization to maintain its own identity.

The motion as amended, being put to vote, was carried.

PRESIDENT: The paper for the evening was to be presented by Mr. F. J. Cole, of the American Locomotive Company, Schenectady, N. Y., but on account of the bad weather we have had in the last few days, he has forwarded his paper, entitled "Four Cylinder Balanced Compound Locomotives," and has delegated Mr. H. B. Ayres, of the Pittsburgh works, to present it for him.

MR. H. B. AYRES: Mr. President and Gentlemen—Mr. Cole wired me this afternoon from Chicago and asked me to present to the meeting his regards.

"FOUR-CYLINDER BALANCED COMPOUND LOCOMOTIVES."

BY MR. F. J. COLE.

Mechanical Engineer American Locomotive Company.

The subject selected by your committee for this evening's paper is the "Four-Cylinder Balanced Compound." I have had a number of lantern slides prepared which will be shown on the screen later on to illustrate the development of this type of locomotive. Before the room is darkened to show the pictures, I want to call attention briefly to the reasons which led up to the use of the four-cylinder balanced compound at home and abroad. Generally speaking, all other locomotives may be characterized as having two main rods connecting the pistons and crossheads to the driving wheels. This construction necessitates the use of excess counterbalance in the wheels opposite the crank pins in order to make the engine run smoothly. While the horizontal moving or reciprocating parts are balanced a vertical component is produced by the centrifugal action of these excess weights, producing alternately an increase and decrease in the static driving wheel weights. This is the cause of the so-called "hammer-blow," which is really a wavelike increase and decrease in the normal wheel loads, reaching its maximum when the counterweight is down next to the rail and gradually decreasing during one ½ revolution until the minimum is reached with the counterweight on top of the wheel. For an ordinary 10-wheel locomotive weighing 163,000 pounds in working order, weight 123,000 pounds on drivers, cylinders 20″x26″, 69″ driving wheels, the static and dynamic weights on driving wheels are:

50 miles per hour—Static, 123,000; Dynamic, 140,500; Increase per pair of wheels, 5,840; 60 miles per hour—Static, 123,000; Dynamic, 148,000; Increase per pair of wheels, 8,340; 70 miles per hour—Static, 123,000; Dynamic, 157,200; Increase, per pair of wheels 11,400.

For a 10-wheel locomotive, 164,000 pounds total weight, 129,000 pounds on drivers, 21″x26″ cylinders, 63″ wheels, the static and dynamic weights on driving wheels are:

45 miles per hour—Static, 129,000; Dynamic, 146,000; Increase per pair of wheels, 5,700; 55 miles per hour—Static, 129,000; Dynamic, 154,400; Increase per pair of wheels, 8,480; 65 miles per hour—Static, 129,000; Dynamic, 164,700; Increase per pair of wheels, 11,900.

In an engine having two pairs of drivers the excess weights per wheel are greater, as they are divided between two pairs of drivers instead of three pairs, but this is somewhat offset by the fact that such engines usually have larger drivers, but where the same size drivers are used the dynamic weights would be increased in direct proportion to the decrease in number of wheels. A practical demonstration of this is to run soft steel or iron wires between the driving and carrying wheels of a locomotive on a testing plant and ascertain the flattening of the wire at various speeds along a length equal to the circumference of the driver. At the Purdue University testing plant Prof. Goss has shown that wires used under these conditions at very high speeds were not flattened in certain parts at all.

As the actual limitations of weight on the drivers of a locomotive which the rails and roadbed will safely sustain, is the dynamic and not the static load, it follows that if no excess weights were used in the driving wheels, considerably more weight may be placed upon the drivers, and consequently a more powerful locomotive could be built to come within a given limitation of weight.

Again the turning moment is more uniform in a four-cylinder locomotive. This arises from two causes:

1. The angularity of the main rods of a two-cylinder locomotive produces a greater turning moment when both cranks are ahead and at 45° each above and below the horizontal center line. For the same reason the pressure is less when the cranks are behind. In the four-cylinder engine this condition does not obtain, as one rod neutralizes the other so that the maximum and minimum turning moments occurring every 90° or four times during each revolution are of equal length. A diagram illustrating this will be shown later on.

2. The relatively larger cut off in the compound produces a more uniform crank pin pressure.

These facts are now so well known that it is unnecessary in this paper to enlarge upon them and discuss them farther.

The idea is old of a balanced locomotive having four sets of pistons, crossheads and rods arranged in pairs, in which the outside horizontal moving parts connected directly to the wheels are balanced by similar inside parts connected to a crank axle at 180° to each other and moving in opposite directions, the other pair working at 90° to the first.

We have now reached a point where the demands for high speed heavy trains is such that advantage must be taken of everything which will materially assist in greater power, less injury to roadbed and to fuel economy. These advantages we find in the four-cylinder balanced compound, and the time is at hand when locomotives of this description are in demand and can be used to good advantage on American railroads. The principal objections raised in the past and perhaps occasionally now, is to the use of crank axles, but the answer to this is that such axles can be made at the present time of such quality and design as to give but little or no trouble. The stresses are better understood and can be provided for, and it is probable that the form of axle which will be largely used is a built-up one balanced within itself. Briefly stated some of the advantages of four-cylinder balanced engines are:

(a) Balancing of reciprocating parts by similar horizontal moving parts. One outside piston and its attachments moving forward while the inside one is moving backward. These exactly balance one another without the use of unbalanced weights in the wheels.

(b) The increase of weight permissible on the driving wheels when considered dynamically. In the ordinary engine, at 60 miles per hour, with drivers 78 inches in diameter, the increase or decrease at each revolution of the static weights on the rail is about 23 per cent. This is due to the centrifugal effect of the excess weights used to balance the reciprocating parts.

(c) Increase of from 25 per cent to 33 per cent in sustained horse-power at moderate and high speeds without any material change in size or style of boiler.

(d) Economy in the use of fuel, water and steam.

(e) The sub-division of power on two axles and four cylinders. Reduction of bending stresses on the crank axle due to the fact that only half the turning moment is transmitted through each axle. The advantages from light moving parts, such as crossheads, main rods, piston rods, etc. The lightness of these parts permits them to be easily handled, and as they have to transmit only half the usual amount of power, the probability is the wear and repairs will be greatly decreased.

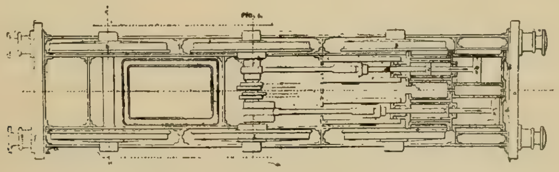
We are indebted largely to the French for the design and practical development of this type of engine. Some 15 years ago the Northern railway, of France, built the experimental four-cylinder compound, No. 701, and from this engine the number has gradually increased until over 1,500 are now running in Europe. In these engines the idea has been steadfastly adhered to of sub-dividing the power and driving two axles independently, the forward, or crank axle, being connected to the low pressure cylinders and the rear axle to the high pressure cylinders.

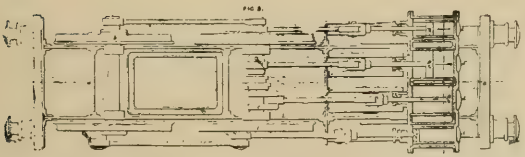
In America, owing to the use of bar frames and heavier engines, there is not room enough between the frames for the low pressure cylinders. It is therefore necessary to transpose this arrangement and place them outside. Theoretically this is not correct, as the larger and heavier parts should be in the center of the engine. The counterbalance for the disturbing portion can be better arranged when placed in this manner. In practice putting the high pressure cylinder inside is the best compromise which can be made, and as a matter of fact but little difference is required in the arrangements of the counterweights and little or nothing can be actually noticed in the working of the engine.

Abroad the utmost refinements have been used for the purpose of fuel and steam economy. Independent valve motions for each high and low pressure cylinder, arranged so that the cut-off can be changed independently of each other are in general use. Separate exhaust valves and adjustable exhaust nozzles are used to improve the starting and to vary the intensity of the blast.

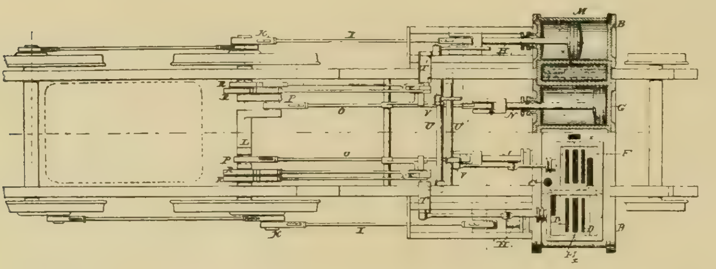
All these appliances, while they make a more efficient machine, increase its complication, and except where handled by men who are on the alert to save fuel on every occasion may result in increased cost of repairs which will more than outweigh the saving of fuel. Furthermore, the demands of service on American roads are more exacting and take up a larger proportion of a locomotive engineer's time than abroad, and render it desirable to limit the number of handles, levers and other mechanical appliances requiring adjusting and alteration to a minimum. In the introduction of this type of engine to American roads and to suit the conditions of to-day it is the concensus of opinion that simplicity should be the keynote, and all devices which are not absolutely necessary to the successful working of the locomotive should be omitted. The only exception being in localities where the price of fuel would warrant the extra cost and maintenance of all the attachments for fuel saving in use abroad.

For these reasons the balanced locomotives built in this country have used only one valve motion to distribute the steam on either side to the high and low pressure cylinders. As few changes as possible have been made over simple engines of similar type other than the application of the crank axle and cylinder arrangement. The ordinary Stephenson valve motion with indirect rocker being used. There seems to be no doubt of some saving in fuel with independently adjustable valve motions which can be changed to suit the varying conditions of railroad service. But it is a question whether we are ready, in this country, at the present time, to sacrifice our ideas of simplicity and directness of means to the end and adopt these ultra-refinements which have been perfected and are in use abroad; and except for purposes of test or unusual cases where there may be some demand for these additional complications, I think it is safe to say that for some time to come the greatest number of these locomotives will be built with the ordinary single valve motion and with the extra parts reduced to a minimum.

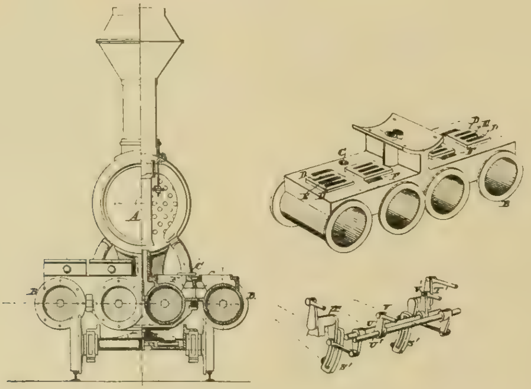




The first picture shown is taken from a British patent issued to Dawes in 1872. This shows the four cylinders in the same transverse plane, the low pressure inside and the high pressure outside the frames, the four main rods being connected to the crank axle. The idea is plainly shown of balancing by similar horizontal moving parts moving in opposite directions, the low pressure piston, crossheads and main rods connected to the crank axle balancing the high pressure main rods, etc., connected to the crank pin on the outside of the driving wheel and balancing each other on one side without the necessity for excess weights in the drivers.

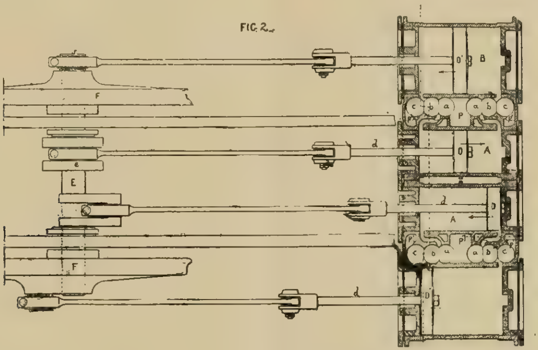


This picture illustrates a United States patent granted in 1877 to A. M. Cummings. It is very similar in principle to Dawes' except simple slide valve cylinders, and is evidently adapted more to American design. The cylinders are on the same transverse plane and the main rods connected to the crank axle.

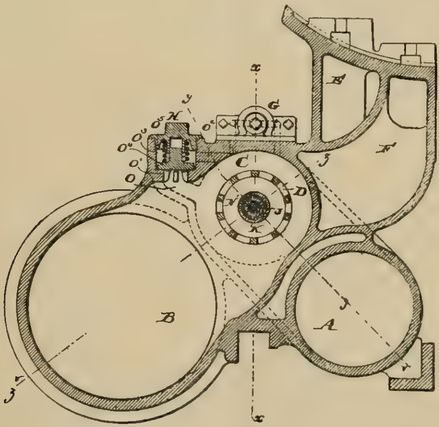


An end view and details of the cylinders and arrangement of link motion are given in the next picture. Some ingenuity is displayed in this respect, avoiding the use of independent valve motion for each cylinder by the use of long rocker shafts extending across the frames. A peculiarity of this engine is the four simple cylinders and the cranks set at 90° in place of 180°. Of course in such an arrangement the balancing is imperfect, as the moving parts are too far apart.

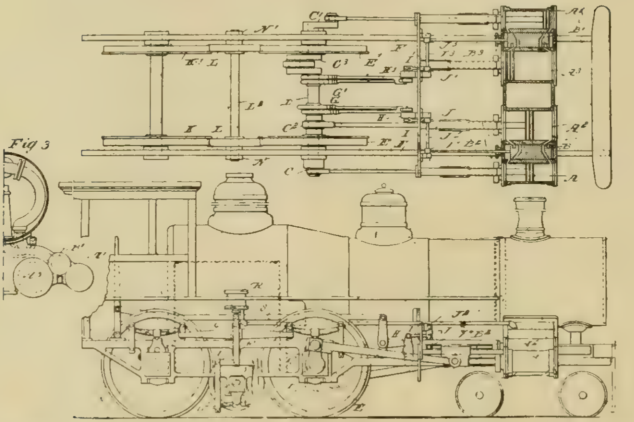
FIG. 2.



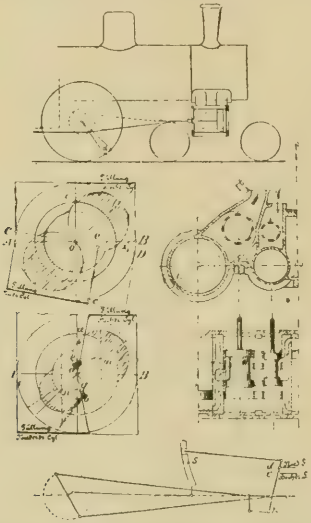
Strong's compound locomotive is shown on the screen. It was patented in 1891. Here, as in Dawes' engine, the cylinders are compound and the cranks set at 180° inside and outside the frames, thus making a balanced construction.



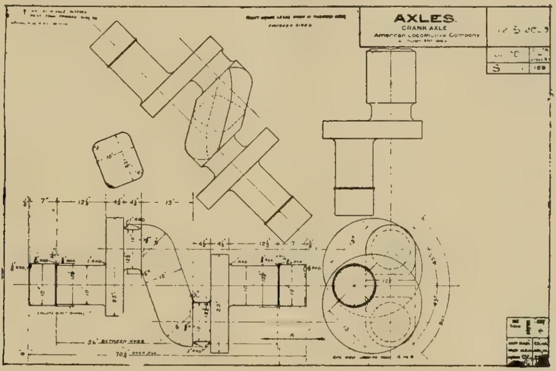
A year later Strong patented an arrangement of high and low pressure cylinders in one-half saddle casting. It will be noticed that one piston valve controls the distribution of steam to both cylinders.



In 1895 Bulla patented in the United States a locomotive having four cylinders in the same transverse plane, arranged in two pairs, with the cranks set at 180°, half saddle cylinders with one piston valve controlling the distribution of steam for the high and low pressure cylinders on either side; the valves being operated by the usual Stephenson link motion. But in this locomotive the idea of the balancing is evidently secondary in the inventor's mind, as the wheels for traction increasing by throwing more weight on the drivers are deemed of the most importance, and each claim involves their use.



The next picture is taken from a Swiss patent granted in 1897 to Von Borries for a balanced four-cylinder compound locomotive. In this design the cylinders are in the same transverse plane, but independent piston valves are used to control the distribution of steam to the high and low pressure cylinder. The main rods are all connected to the same axle.



After investigating the various forms of crank axles used in Europe, the American Locomotive Co. decided upon the Z shape or the design having a diagonal member. The picture on the screen now before you shows this form of axle which was applied to the New York Central locomotive No. 3000 exhibited at the World's Fair at St. Louis. The weight of this axle finished is 3,200 lbs. It was forged and finished completely by the Krupp Works at Essen, Germany.

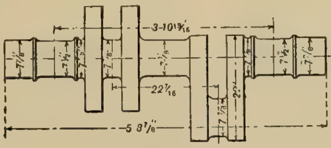


Fig. 1.

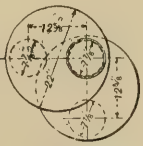


Fig. 2.

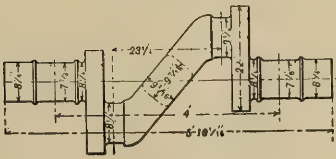


Fig. 3.

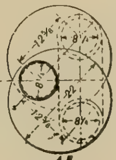


Fig. 4.

The next picture shows two forms of crank axles used in Europe, the illustration and description in part being taken from Mr. A. Herdner's paper, entitled "The Compound Locomotive and Its Development in France," published by the American Engineer and Railway Journal, December, 1902.

Mr. Herdner's remarks are as follows:

"Indeed until 1890 the Northern and Western Railways of France were the only roads that made use of inside connected cylinders for their high-speed locomotives. The other roads have shown themselves more reserved. On the Southern, particularly, to which the writer belongs, the crank axle was absolutely banished from locomotive construction, and when three years later, in consequence of the constant increase in weight of our express trains, we were led to put in service 14 four-cylinder compound locomotives similar to those of the Northern Railways of France, we were naturally very much concerned as to what service the crank axles, driven by the low pressure cylinder pistons, would render in practice. Those axles were of the Worsdell type with circular plates, and are represented by Figures 1 and 2.

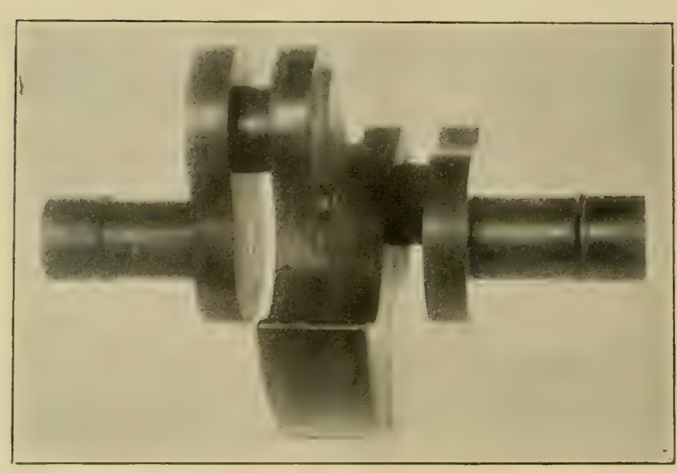
"The successive appearance of cracks on three of the axles after a mileage of 37,500, 58,000 and 133,000 miles, respectively, seemed to justify the fears we had conceived in that respect, and yet a much longer experience leads us today to believe those fears to have been exaggerated. Of the fourteen crank axles put in service in 1894 and 1896 there remain eleven totally free of any fracture or crack, and their mileage varies from 212,100 to 293,900 miles.

"In the more recent four and six-wheel connected locomotives the Worsdell axle has been replaced by the Z shape axle, as shown in Figures 3 and 4. The design of this axle is obtained from the Worsdell axle by substituting in place of the two inner circular disks and the portion of the axle between by a rectangular bar connecting the two journals. Sixty-three of these axles have been put in service between the years 1896 and 1901, inclusive, and none of them have shown the slightest trace of a possible fracture, the oldest of these axles having already made a mileage of 206,200 to 242,000 miles. These results lead us to believe the axle of the Z shape is more advantageous than the one with the two circular plates, and indeed we give it preference to the former design, except when the central portion of the axle has got to be utilized for carrying the eccentrics, as is the case in our new consolidation type engine, about which I shall say a few words at the end of this article. At any rate, this matter of viewing this question will be still strengthened at longer experience."

Owing to the expense of making solid crank axles, the danger of internal strains and of cracking, with the necessity for scrapping the whole axle when cracked, the built-up axle is gradually being substituted and coming into use more and more every year. In the built-up axle the danger from internal strains is very much reduced, as the pieces are either cylindrical or flat, straight, plain ordinary pieces without abrupt changes of shape. The cracking at the corners is therefore confidently expected to be very much reduced, and if such cracking does occur the part failing can be replaced without discarding the entire axle.

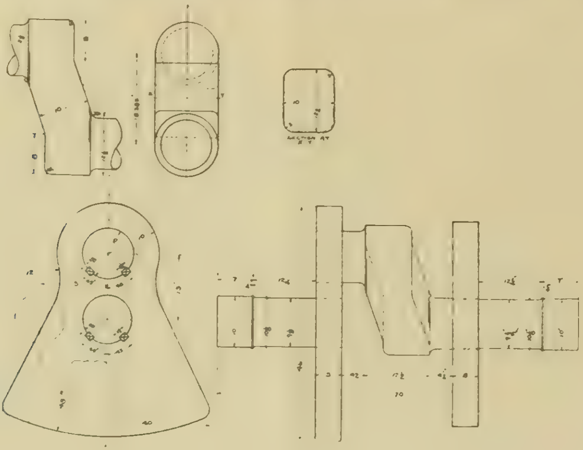
One contributary cause to the overstraining and consequent decrease in life of the ordinary solid or built-up crank axle is due to the bending moment caused by the centrifugal force of its own unbalanced weight. Calculations show that this is a considerable force which must be provided for, amounting to 5,300 lbs. fibre stress per square inch at 320 revolutions per minute in the ordinary design.

This is due entirely to the centrifugal action of the unbalanced weight producing a bending moment, the magnitude of which varies according to speed, the amount the axle is out of balance and the distance between the centers of frames. This naturally directs attention to a design having the flanges or checks prolonger in the opposite direction so as to balance it without its own structure.



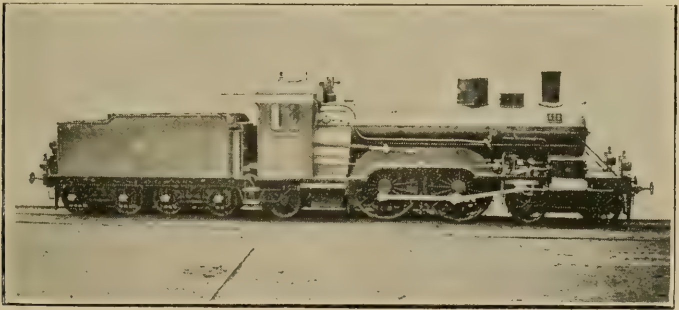
Such an axle is now shown on the screen. It was made by Mr. Drummond, of the London & Southwestern Ry. and is composed of nine pieces. At first sight it seems complicated and unwieldly, but upon investigation the construction is very simple and the design is well worth considering. The Engineering (London), makes the following comments:

"It is built-up and the axle and webs are of mild steel, the latter having the ends prolonged to form balance weights. All the revolving and part of the reciprocating masses are balanced in the axle, and, as these are balanced in the planes in which the disturbances are created, the axle is relieved of the destructive stresses caused by the balancing in the wheels."



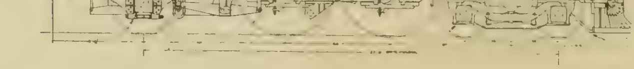
By this, many objectionable features disappear, the bending stresses due to axle being out of balance are done away with and the cracking which is characteristic of crank axles will doubtless be largely overcome.

The prolongation of the sides, while it makes an easy way of balancing, does not make use of the metal in the most efficient way. By combining the balanced weight in the center portion at an angle of 45° with each of the cranks the excess metal may be located to much better advantage. Such a design is now shown upon the screen. The axle is built up of seven pieces and the center portion made with its overhanging weight so that the axle is completely balanced and free from bending strains, caused by unbalanced weight. Another form of built up axle is now shown. This consists of five parts, the diagonal connecting piece being used.

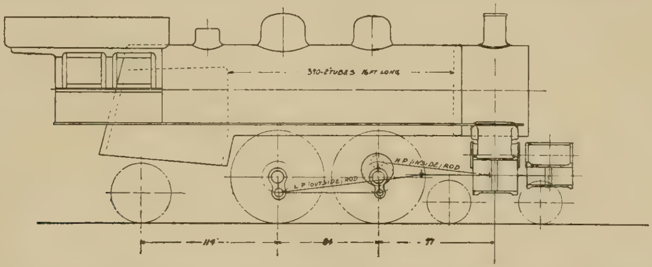


The picture now before you is a four-cylinder balanced compound locomotive equipped with Pielock superheater and built at Hanover, Germany, in the locomotive works founded by Geo. Egestorff. It was exhibited at the World's Fair, St. Louis, and tested on the P. R. R. testing plant. The type is Atlantic 442 C 133 with Von Borries valve gear. The principal dimensions are:: Size of cylinders, 14 inches and 24x24 in.; Driving Wheels, 66 inches; Wheel base, driving, 6 ft. 10¾ in.; Wheel base, total, 29 ft. 3⅜ in.; Steam Pressure, 199 lbs.; Heating surface tubes, 1504 sq. ft.; Heating surface, superheater, 310 sq. ft.; Heating surface, firebox, 108 sq. ft.; Total heating surface, 1922 sq. ft.; Grate area, 29 sq. ft.; No. of tubes, 241; Diameter of tubes, outside, 2 in.; Length of tubes, 14 ft. 7 in.; Weight on drivers, 67,000 lbs.; Total weight in working order, 132,700 lbs.; Weight empty, 119,500 lbs.

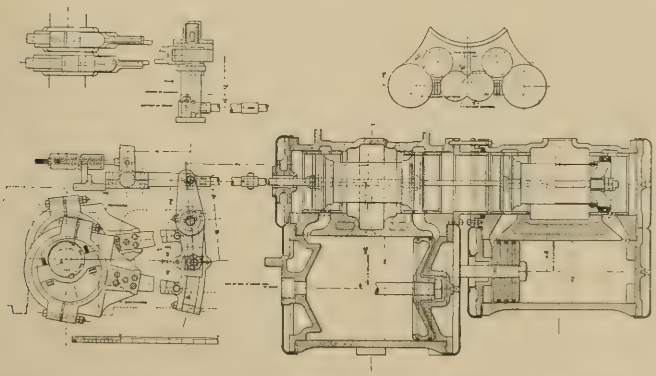
The New York Central four-cylinder balanced compound No. 3000, class 442C200, is now illustrated. The principal dimensions of this engine are as follows: Cylinders, 15½ in. and 26x26 in.; Drivers, 79 in.; Wheel Base, driving, 7 ft.; Wheel Base, total, ; Weight on truck, 50,000 lbs.; Weight on drivers, 110,000 lbs.; Weight on trailer, 40,000 lbs.; Total weight, 200,000 lbs.; Heating surface, firebox, 175 sq. ft.; Heating surface, firebrick tubes, 23 sq. ft.; Heating surface, tubes, 3,248 sq. ft.; Heating surface, total, 3,446 sq. ft.; Grate area, 50.23 sq. ft.



The outline elevation of the engine is next shown. You will notice the ordinary Stevenson link motion is used with the conventional type of reversing rocker, except it is somewhat modified in order to pass behind the front driving wheels. The valve stem is exactly over the center of frame and passes through the spring hangers and spring saddle. Apart from the crank axle and the arrangement of cylinders the engine is substantially the same as the New York Central standard Atlantic. The weight, however, is increased about 14,000 lbs., owing to the extra pair of cylinders, piston rods, crossheads, crank axle, etc.

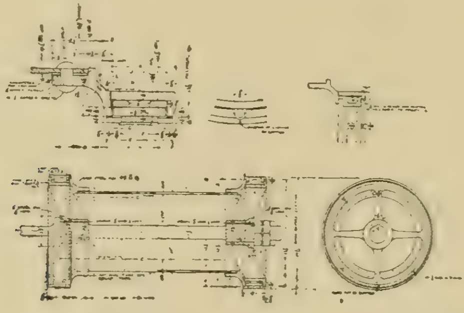


This view shows an outline of the arrangement of the engine, representing particularly the cylinders, main rods and driving wheels. The object in placing the high pressure cylinders ahead is to avoid an unnecessary length of boiler and wheel base, and to obtain a good length of high pressure main rods. In this particular engine but few changes were made over the regular New York Central Atlantic type engine. The flues are maintained at 16 feet, the distance from center of cylinders to forward drivers is only 3 inches more than the regular engine. This was in order to obtain necessary clearance for the low pressure cylinders and engine truck wheels. Any other design of Atlantic engine having cylinders in the same transverse plane necessitates lengthening the boiler from 30 inches to 3 feet.

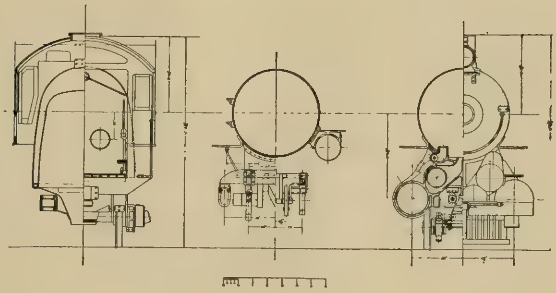


This illustration shows a longitudinal sectional view through the valve chamber and the high and low pressure cylinder. For convenience the three sections are assumed to be on the same plane. The live steam from the boiler enters at the top and center of the inside admission high pressure valve and is exhausted at the ends of the valve into the receiver. That from the forward port passes through the valve to the outside admission low pressure valve. This arrangement of inside and outside admission valves, corrects the effect of the crank axle and distributes the steam in relation to the cylinders, so that both valves can be driven from one valve stem.

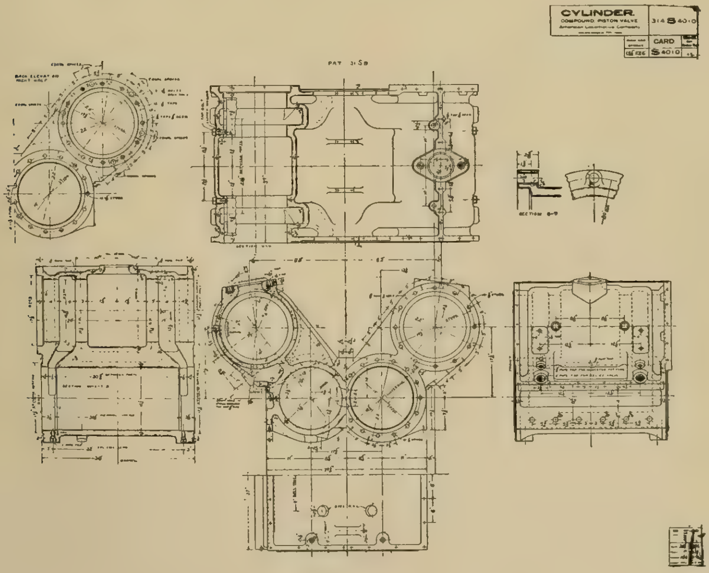
The rocker, links and eccentrics are also shown. These, it will be noticed, are substantially the same as used for ordinary single expansion engines. So that apart from the two valves no additional complications are introduced.



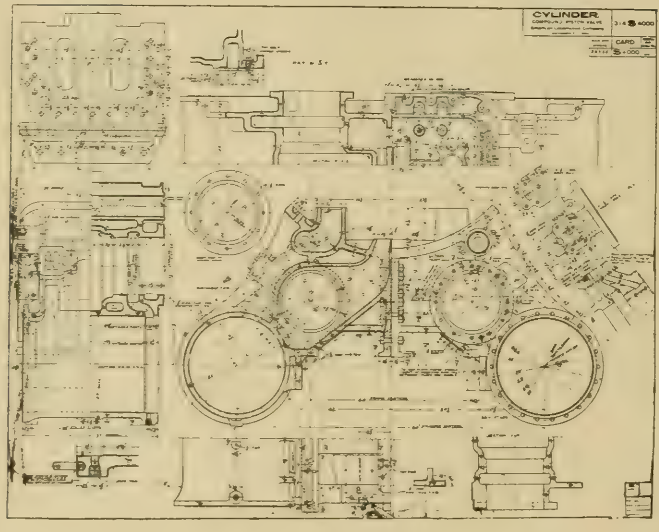
A detail of the valve is now shown. It is of built up construction, with cast iron bull ring and L shaped rings. These rings are inserted in the groove without springing and therefore are not distorted but fit the valve chamber and are much tighter to prevent the loss of steam. The body is of wrought iron pipe for strength and lightness, the spiders of cast steel, the several parts being accurately turned to fit one another. The valve stem passes through the center and is arranged with double nuts and a flat key so that the different parts are securely held in place. In reality this arrangement is lighter and better adapted to the purpose than a single valve cast in one piece. Only eight packing rings are used, while the usual arrangement of single valve is in reality three valves in one instead of two valves. These single valves require twelve packing rings.



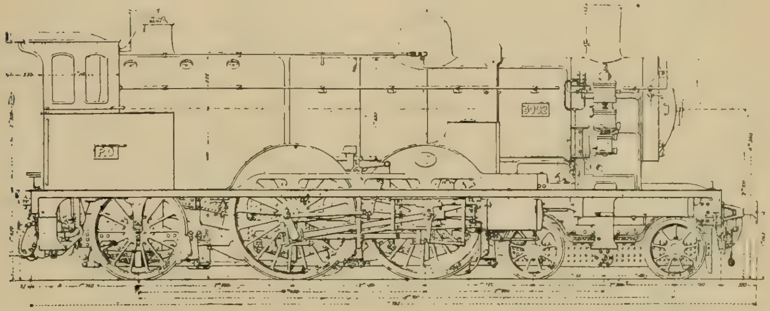
Cross sections of the engine are shown in the next view. An enlarged cross sectional view through the cylinders is given showing the relation of the high pressure crossheads to the engine truck and low pressure cylinders. Also the live and exhaust steam passages in the low pressure cylinder.



The picture now shown is a photographic reduction from the working drawing of the low pressure cylinders. The next is a similar view of the high pressure cylinders.



This engine was built in April, 1904, and was run on the New York Central for about six weeks, operating the fastest and heaviest trains such as the Lake Shore Limited, Fast Mail, etc. It was afterward exhibited at the World's Fair at St. Louis and tested on November on the P. R. R. testing plant. Very careful calculations were made of the counterbalancing and it was adjusted so as to produce a minimum amount of vertical effect on the track and nosing of the locomotive. During the test at St. Louis, 1,630 indicated horse-power, 1,470 dynamometer horse-power and 9,796 lbs. draw-bar pull was developed continuously at 57 miles per hour, 50 per cent. cut-off; 1641 indicated horse-power, 1,476 dynamometer horse-power and 9,896 lbs. draw-bar pull at 57 miles per hour, 55 per cent. cut-off was developed continuously for two hours. 1,369 indicated horse-power, 1,189 dynamometer horse-power and 6,788 lbs. draw-bar pull at 66 miles per hour, 40 per cent. cut-off, was developed continuously for one hour and a half. 1,336 indicated horse-power, 1045 dynamometer horse-power and 5,224 lbs. draw-bar pull at 75 miles per hour at 40 per cent. cut-off was developed continuously for one hour. This latter test was run without any evidence of heating and could have been readily sustained for a much longer period if required.

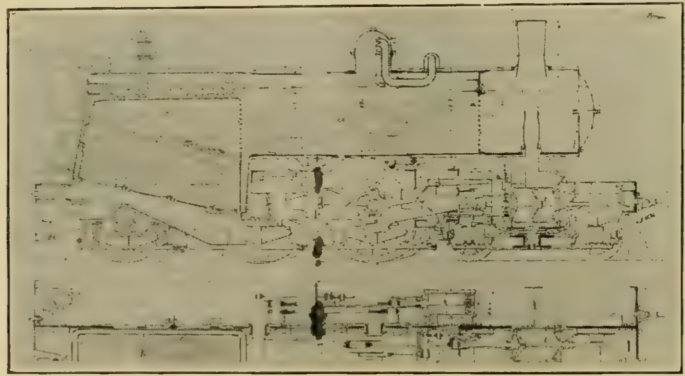


The next illustration shows the De Glehn four-cylinder balanced Atlantic passenger engine, class 442 C 160, built for the Paris-Orleans Railway, similar to that purchased by the Pennsylvania R. R. and imported into this country last year. The Pennsylvania engine has been run on different parts of the Pennsylvania R. R. in regular service, was exhibited at the World's Fair in St. Louis and tested on the P. R. R. testing plant. It represents the latest development of the DeGlehn engine and was not modified or changed in any essential features, with the exception of the tender and arrangement of air brake couplings, and a slight increase in the length of the cab. Otherwise it is exactly similar to the engine running on the Northern Railway of France. The principal dimensions are: Cylinders, 14 3-16 in. and 25⅝x25 3-16 in.; Drivers, 80 3-16 in.; Wheel Base, driving, 7 ft. ½ in.; Wheel base, engine, 28 ft. 6½ in., Weight on drivers, 79,500 lbs.; Weight on truck, 46,500 lbs.; Weight on trailers, 34,000 lbs.; Total weight, in working order, 160,000 lbs.; Heating surface, firebox, 181 sq. ft.; Heating surface, tubes, 2,435 sq. ft.; Heating surface, total, 2,616 sq. ft.; Grate area, 33.9 sq. ft.; Serve Ribbed tubes, inside diam. 2 9-16 in., length 14 ft. 5¼ in.; Boiler pressure 227 lbs.; Maximum tractive power, operating simple 18,270; Maximum tractive power, operating compound 19,527.

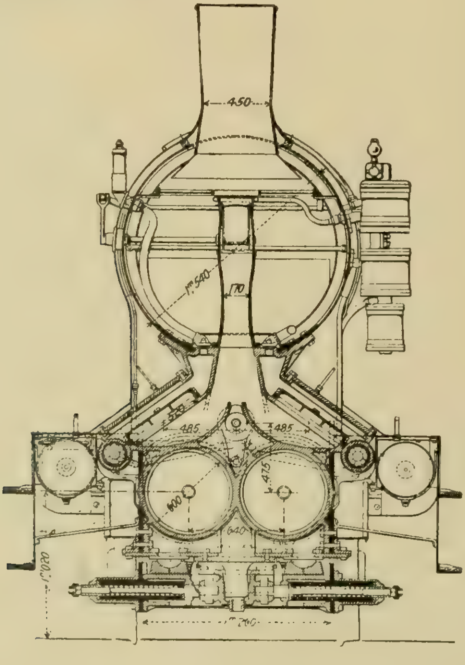
This is a well designed and finely finished locomotive representing the latest and best French practice. Four separate sets of valve motion are used, one for each cylinder. The cut-off can be adjusted independently for both high and low pressure cylinders, the adjustment being made by a screw reverse gear which can be readily changed to alter the relative positions of the high and low pressure cut-off. A separate exhaust for starting and adjustable exhaust nozzle are used. The engine contains all the refinements for fuel saving and efficient working with the exception of the superheater which have been developed at the present time.

Attention is called to the Walschaert valve gear. Apart from the four-wheel leading truck there are but few American features on this engine.

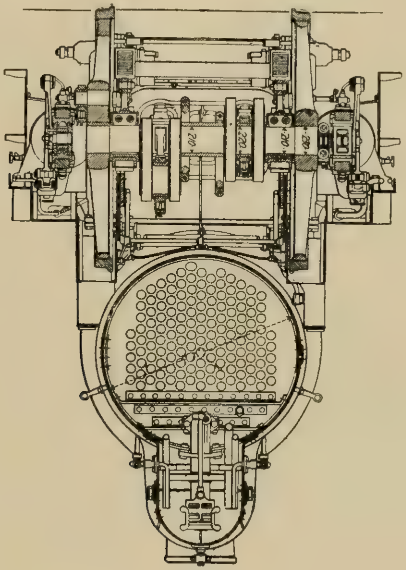
The usual European construction of plate frame, small cab, sand box in driving wheel covers, etc., are adhered to.

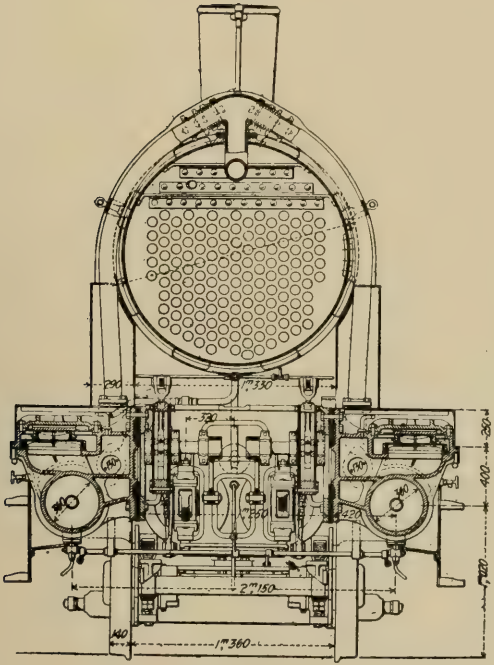


The next view is a longitudinal section and half plan. This shows clearly the arrangement of the cylinders and method of coupling the low pressure cylinders which are inside the frames and forward driving axle. The high pressure cylinders are outside and placed close to the front driving wheels with rods connected to the rear drivers. Mr. De Glehn lays particular stress on the advantages of sub-dividing the power and driving the two axles independently.

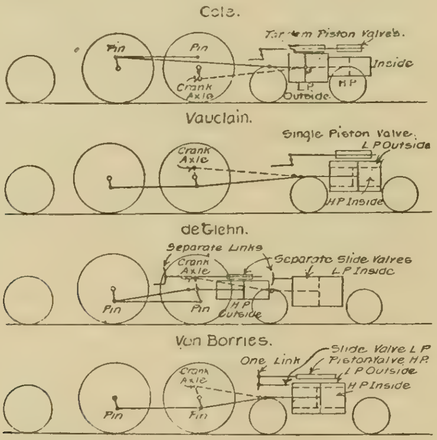


The cross sectional arrangement of the cylinders is next shown.





Next is a sectional view just ahead of the front driver and shows the crank axle and bar frames, and a sectional view through high pressure cylinder showing arrangement of steam pipes with high pressure pipe from the boiler. The illustrations of this engine are taken from the American Engineer & R. R. Journal.

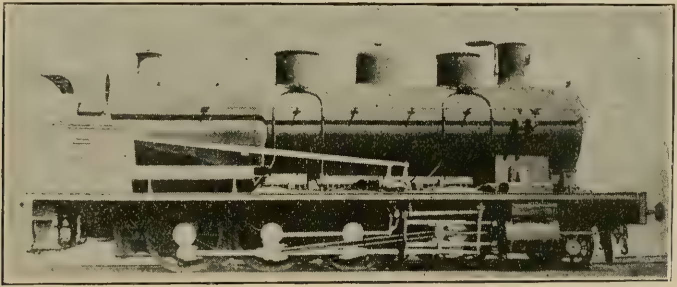


The next illustration is taken from the Railway Age and shows four different arrangements of four-cylinder balanced compound Atlantic engines. The one at the bottom is Von Borries, in which the four-cylinders are in the same transverse planes, each cylinder having an independent valve but connected in pairs, Walschaert gear is used with an arrangement of rockers imparting motion to high and low pressure cylinders on one side, giving a different cut-off to each cylinder which is fixed and cannot be altered by the engineer. The high and low pressure rods are all connected to the first pair of driving wheels.

The next is the De Glehn system with independent valves and valve gear capable of adjustment by the engineer. The low pressure rods drive the forward driver and the high pressure rods the rear driver, the parallel rods being used merely to keep the wheels in proper relation with each other.

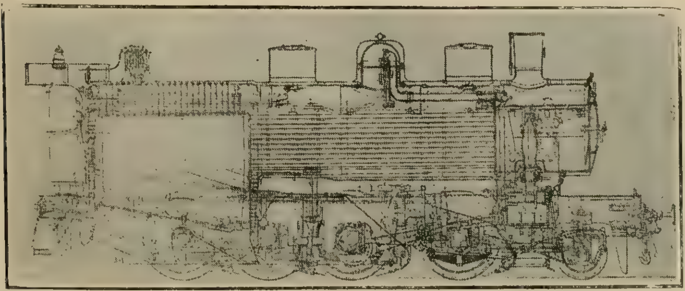
The next is the Baldwin arrangement of cylinders in the same transverse plane, one piston valve operating the low pressure cylinders on each side, driven by the ordinary Stevenson link motion, the high and low pressure rods being both connected to the crank axle. While this valve is in one casting, yet in reality it is three valves, twelve packing rings being used.

The next is the American Locomotive Company's design in which the high pressure cylinders are placed inside. The single valve motion and valve chamber being used to operate both cylinders on one side. While there are two distinct valves on one stem yet only eight packing rings are used. The high pressure rods are connected to the forward drivers and the low pressure to the rear as in the DeGlehn.

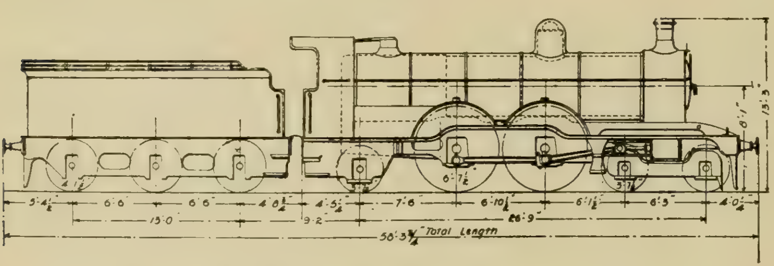


The next view is an eight coupled four-cylinder compound freight locomotive, class 280 C 157, built for the Southern Rys. of France.

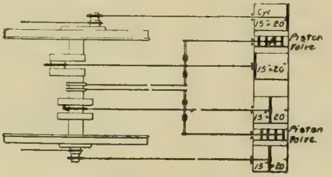
Cylinders, 15$\frac{3}{8}$ in. and 23 19-32x25 19-32 in.; Drivers, 55$\frac{1}{8}$ in.; Total wheel base, 23 ft. 1 9-16 in.; Weight on drivers, 142,120 lbs.; Total weight, 157,520 lbs.; Heating surface, tubes, 2,586 sq. ft.; Heating surface, firebox, 170 sq. ft.; Heating surface, total, 2,756 sq. ft.; Grate surface, 31 sq. ft.



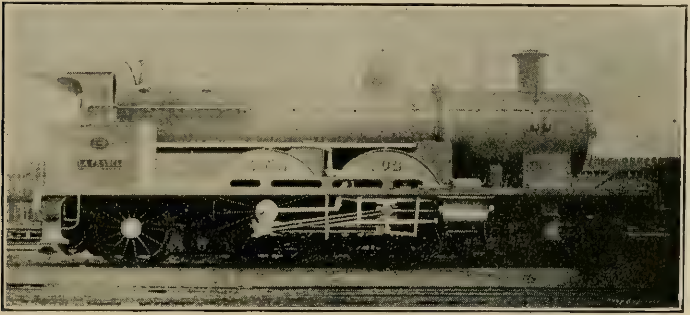
The next is a longitudinal section of the same engine showing the arrangement of inclined high pressure cylinders. You will notice the cylinders are in the same transverse plane, the high pressure being inclined sufficiently so that the guides and rods clear the front driving axle and the second pair of driving wheels being arranged with crank axle. The low pressure cyilnders are outside and connected with the third pair of drivers. The Walschaert valve gear is used as is customary on at least 80 per cent. of European engines.



The next picture on the screen shows a four-cylinder simple locomotive built by the Great Northern Rys. of England and the principal peculiarity of this engine is the four simple cylinders. Designers have usually considered that four-cylinder engines of the balanced type are essentially a compound proposition and regard the use of simple cylinders as very questionable practice. From the fact that very few engines of this description have been built would indicate that in comparison with the compound cylinders it has not proved as successful as the builders might have anticipated. The principal dimensions are: Class 442-134; Cylinders, 15x20 in.; Driving wheels, 79½ in.; Driving wheel base, 82½ in.; Total wheel base of engine, 26 ft. 9 in.; Weight in working order, 134,4co lbs.; Heating surface, firebox, 140 sq. ft.; Heating surface, tubes, 1,162 sq. ft.; Heating surface, total, 1,302 sq. ft.



The illustrations and description are taken from The Railway Age.



This engine is a four-cylinder compound Atlantic passenger class 442 C 146, built by Mr. De Glehn for the Great Western Ry. of England. It has been illustrated widely in the technical papers and is interesting particularly from the fact that owing to the excellent results obtained in France from these engines a prominent English railroad is willing and anxious to try a similar engine in direct comparison with their own build. The principal dimensions are as follows: Cylinders, 13⅜ in. and 22 1-16x25 3-16 in.; Drivers, 80½ in.; Total wheel base of engine, 27 ft. 10⅝ in.; Weight on drivers, 34½ tons; Total weight in working order, 65 tons; Heating surface, firebox, 167 sq. ft.; Heating surface, tubes, 2,158 sq. ft.; Total heating surface, 2,325 sq. ft.; Boiler tubes, 126 of the Serve pattern; Boiler tubes, internal diameter, 2 9-16.

You will notice all the European characteristics such as sand box, wheel covers, plate frames and Walschaert valve gear. The outside journal boxes on the engine trucks is rather an unusual design for a locomotive, but present some advantage from accessability for oiling the bearings and re-packing. I have not been able to obtain any accounts of tests of this engine in comparison with English engines.

To apply the four-cylinder balanced principle to 4-4-2 "Atlantic," 4-6-2 "Pacific," 4-6-0 "10-wheeler," 4-8-0 "12-wheeler" types of American engines, requires either the high pressure cylinders to be located ahead of the low, with only a slight increase in wheel base or length of boiler, or an increase of 30 in. to 36 in. in the normal length of engine between the front driver and the cylinder centre. This also involves increasing the boiler and flues a like amount.

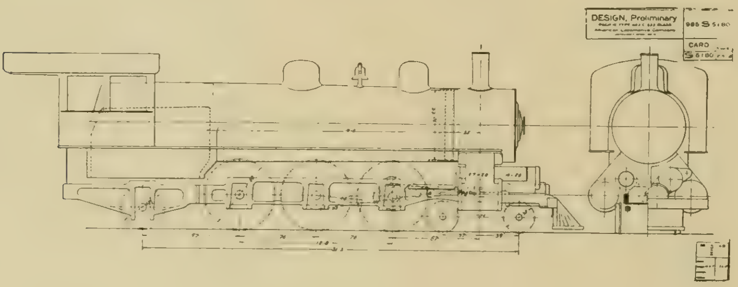
When applied to a locomotive having a two-wheeled leading truck, three different methods are available:

(a) Locating the high pressure cylinders ahead and increasing the distance between front driver and center of cylinders about 24 inches.

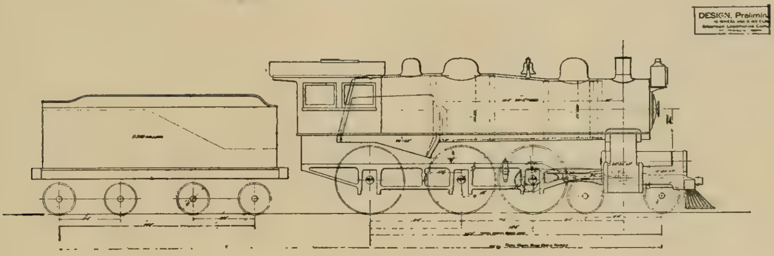
(b) Inclining the high pressure cylinders to clear the front driving axle.

(c) Looping the high pressure main rods so as to encircle the front driving axle.

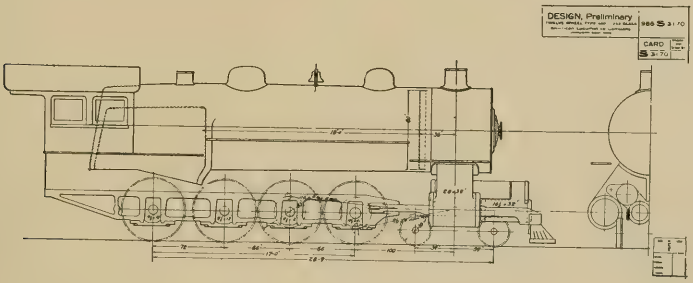
These arrangements are named in the order of their practical availability. In considering the advantages of balanced engines it is well to bear in mind that their use is by no means confined to high speed passenger service. The destructive effect on the track of excess weights in driving wheels is a matter of revolutions and not necessarily of speed. The dynamic effect of a medium sized wheel, running at a high speed in revolutions, while making a moderate number of miles per hour, is just as great as a large wheel at the same number of revolutions making a much higher speed in miles per hour. Furthermore, the necessity for subdivision of power in a very heavy fast freight engine is more urgent. The probable decrease in the repairs of the lighter parts will go far toward paying for the first cost and maintenance of the extra number of moving parts.



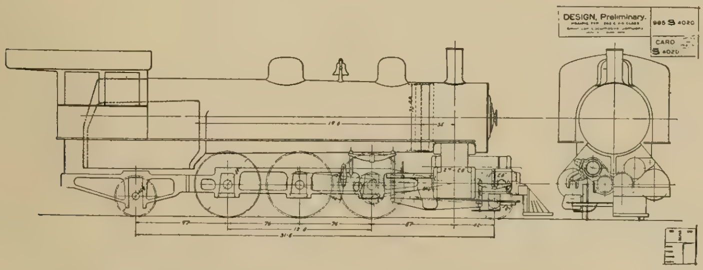
Slide No. 32 shows a preliminary design of Pacific engine, 462 type, arranged as a balanced compound with the crank axle at the forward drivers. The high pressure cylinders are ahead of the low. No increase has been made in the length of the boiler or flues.



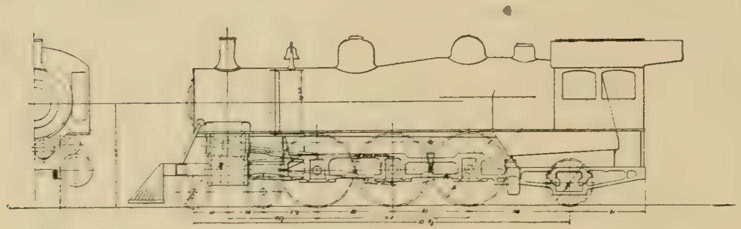
A similar arrangement of balanced compound is shown in slide No. 33 applied to a 10-wheel passenger engine, 460 type.



Slide No. 34 shows the principal applied to a 12-wheel freight engine, 480 type, the forward drivers being provided with crank axle and the high pressure cylinders ahead of the low as in previous designs.

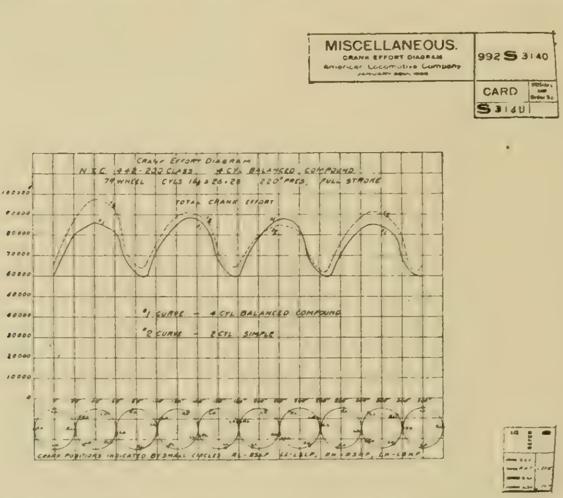


Slide No. 35 shows the application to a Prairie passenger engine, 262 type. In this design it is necessary to use a forward truck with outside bearings so as not to interfere with the high pressure cylinders. The distance from the front driver to the center of cylinders is increased about 23 in. over the normal distance required for simple cylinders.



Slide No. 36 shows a Pacific passenger engine, 462 type, in which the high and low pressure cylinders are on the same transverse plane, the inside high pressure cylinders being inclined so that the main rod and guides are over the forward axle. In this design the middle or main wheels are arranged with a crank axle and the high and low pressure rods connected on this pair of drivers. The eccentrics are placed on the rear driving axle with an ordinary reversing rocker between the main and rear pairs of drivers, the connection to the valve being made by a long valve stem.

The foregoing slides show some of the applications of four-cylinder balanced compounds to different types of locomotives, illustrating its wide application to a variety of service.



Slide No. 37 shows the crank effort diagram comparing the turning moments at the crank pin of a four-cylinder balanced compound Atlantic locomotive with a simple engine of similar tractive power. Curve No. 1 of solid lines shows the greater uniformity of the turning moment of the balanced compound. Curve No. 2 of dotted lines shows the two-cylinder simple engine. It will be noticed from this the greatest turning moment and consequent tendency to slip is when both cranks are forward of the center of the wheel at an angle of 45° from horizontal.

PRESIDENT: Mr. Ayres being called in on such short notice it is hardly fair to presume that he is prepared to answer questions. But we have with us to-night a gentleman connected with the New York Central who has had opportunity to watch the performance of four cylinder compounds. Mr. F. M. Whyte, mechanical engineer.

MR. F. M. WHYTE: Mr. Chairman and members of the Club—I thank you for this opportunity to address you, but I think my notice to be present with the club was even shorter than Mr. Ayers'. I had not expected, until three or four o'clock this afternoon, that it would be possible for me to be present. I have prepared no data relating to the Cole Balanced Compound Locomotive and about all I can say is that the engines "Speaks for Itself." It should be understood that Locomotive 3000 in service on the New York Central is the first one of these engines to be built and therefore it would not be unreasonable to expect that the design could be improved upon, after having experience with it. I wish to say that in actual service the engine has been doing very nicely. Everybody has been well pleased with the satisfactory operation and the smooth riding of it. But the Pennsylvania tests at St. Louis are the only accurate ones which have been made of economy and tractive effort, etc. It is expected that the New York Central may make some investigations of its own in road service.

PRESIDENT: We have another gentleman with us who has given considerable attention to the subject of steam distribution. I will ask Mr. Ira C. Hubbell to speak.

MR. IRA C. HUBBELL: Mr. President and Gentlemen—During the greater portion of my business career I have had quite a little to do with railway operations and wherein I have been up against the question, "What does it cost to move your tonnage?" "good and hard," as the saying is.

I think the largest solitary item of expense entering into railway operations is the "Cost of Fuel for Locomotives," and I have never worked for but one railroad where I did not have direct charge of the purchase, distribution and accounting for the company fuel, no matter what my official connection with the line.

The Interstate Commerce Report for the year ending June 30th, 1899, shows cost for fuel for locomotives $77,187,344.00; for the year ending June 30th, 1902, $120,074,192.00; for the year ending June 30th, 1903, $146,509,031.00. These figures read like the signs at the railroad crossings; they cause you to STOP, LOOK, LISTEN, and like many others I have turned and tossed at night as in the day planning various ways to reduce this enormous expense, and the figures just presented show a greater necessity than ever for a Moses to lead the railroads out of the bondage of a relentless dark master. I am to-day buying all the coal a certain railroad uses and some of which has to be shipped to the west coast of a neighboring republic, and at its destination is almost valuable enough to be worn as jewels for personal adornment, so that the Nemesis of my youth still pursues me.

Mankind is a peculiar thing as observed from the usual viewpoint, and as a rule we all forget the effects of our environments and the limits imposed by our adherence to various lines of thought which we unconsciously, or otherwise, absorb from our surroundings. We are all of us more like the tree toad than any one of us is willing to frankly admit.

To illustrate the point; it is not many centuries ago that all men, speaking generally, accepted as fact the simple statement that the world is flat, and we all know what happened to the man who first declared that the world is round—he got into jail, such as they had.

The history of the world through all the past centuries records the repetition of this same condition and atrocious crimes have followed the effort of men to break down traditions that higher and more advanced environments might abound to the actual good of all.

All of this is true and germane to the subject presented for our consideration by the paper before us this evening.

I think I am correct in saying that Sickles gave to the world its first practical lessons in the more economical use of steam in the cylinder of a steam engine. Here let me say that steam is only a convenient form of wheelbarrow to convey the heat generated by the fuel in the fire-box of the boiler to the cylinder of the engine, for it is the heat that is utilized in the development of power, not the water,in that if we had a 5,000 horse-power condensing steam plant in the basement of this building, and there were no leaks of any nature between the boilers and the engines, condenser, pumps and boilers,we would never fill the boilers with water but once. It is the heat alone that does the work and the water is only a convenient means to convey the heat of the combustion to the cylinder of the engine. Therefore, by the economical use of the steam in the cylinder of the engine you decrease the expense of fuel and this was the work of Sickles.

I believe George H. Corliss was probably the first to carry this development to what we might properly call demonstrated practice. Practical knowledge is theory demonstrated.

Do you know anything about his struggles in his effort to help and bless mankind? His first engines were given away; yes, that's true, a free gift to the one who would accept them, and yet this very act on the part of Corliss brought to him the highest price ever received by an engine builder for steam engines, and in this way: Corliss would go to a man using an engine of the same design his grandfathers and great grandfathers had used, because of that same old tradition that all of us know something about, and Corliss would offer to give that man a brand new engine in exchange for his old patriarch, provided the man would agree with Mr. Corliss to continue to pay him, Corliss, the same annual fuel bills as under the old engine, for a term of years, and I understand many a Corliss engine went in on this basis, given away—and yet, what a price the other fellow paid for his new engine. I wonder if these fellows ever woke up to what their traditions had cost them.

The development of the Corliss engine marked an epoch in the use of steam in the cylinders of engines, and here comes another of the phases of average human thought—that is the lack of thinking for ourselves. I met a man at one time who told me he hired the minister to pray for him. He hired the doctor to keep him well. He hired the lawyer to keep him out of trouble, and so on, throughout the list of human experiences, and there are others of his class whom we all meet every day in our shops, in our offices and wherever we roam. The men who do their OWN thinking, the men who can deliver a message to Garcia without being told which street car line to take, are scarce. The boy who has a father and mother who make him do his own thinking and teach him to act while he is thinking is a very fortunate boy.

It is this habit of looking at something perhaps new to our thought, saying, "Gee whiz, ain't that great!" and then running off to ask some one of supposed greater intelligence than ourselves about it, that keeps our minds filled with "useless lessons of vice and immorality," to quote from one of my schoolboy speeches, and holds us back from a benefit that might be ours, saving us much labor and great expense if we did a little quiet, careful thinking on our own account.

It is because of this condition as above described, that relatively few people to-day can tell you why a Corliss engine is economical in the use of steam, fuel, that is why a Corliss engine will produce more finished product from a given quantity of steam generated, of a given pressure, than other types of stationary engines. It is because of this condition that few persons relatively can give you the true reason why a condenser increases the power of an engine. They simply do not think, or as said by Savonarola, "They refuse to think, save as the ancients thought—they refuse to speak, save as the ancients spake."

It is generally supposed that the Corliss Engines are economical in the use of steam because they are run at rotative speeds of 150 revolutions per minute or less—that is because these engines have a low rotative speed—whereas the slow speed is against the economical use of steam, in that the longer the steam is in contact with the cooler surfaces of the cylinder, necessarily is in contact with the cooler surface of the cylinder, necessarily the greater the amount of heat of the steam lost through radiation. The economy of the Corliss engine lies solely in the valve movement, which permits of better cylinder design by reducing cylinder condensation and making possible a marked reduction of cylinder clearance over the automatic slide valve engine, by delaying the opening and closing of the exhaust ports until about 90 per cent. of both the forward and backward travel of the piston is completed. This increases the mean effective pressure from a given quantity of steam admitted to the cylinder, and enables the reduction of volume in the steam ports, insures a greater ratio of expansion and accomplishes a lower terminal pressure at each exhaust, increasing the ratio of the mean effective pressure to the terminal pressure. But owing to peculiarities of the Corliss valve gear, it is necessary to use four valves, and in order to keep down the cylinder clearance, the stroke in Corliss cylinders must be two and one-half or three times the bore. Correct steam distribution, however, is had to-day with a simple valve gear, which can be safely operated at any required speed, employing only one balanced valve of simple design, hence in short stroke cylinders, that is where the stroke is only one and two-tenths times the bore, it is possible to reduce the cylinder clearance below the best known Corliss practice, or that of any other engine builders.

The high speed automatic engines are not "coal eaters" or "steam chewers," as popular opinion expresses it, because "high speed," but these engines are wasteful of steam (and this means coal) for exactly the same reason that the engines of our present locomotives are wasteful, namely, because the valve movement makes necessary not less than eight per cent. in cylinder clearance to accommodate the increased volume of steam in compression, inseparable from the early closing of the exhaust port on each return stroke of the piston and which cannot be avoided with the present valve movement of either the locomotive or in these automatic engines. The steam distribution on these automatic engines and the locomotives is practically the same, and therefore the steam and fuel consumption is practically the same, and as shown by the two enlarged diagrams, Figures 1 and 2, presented for your observation, one ot which is from a locomotive and one is from a high speed automatic stationary engine—which is which?

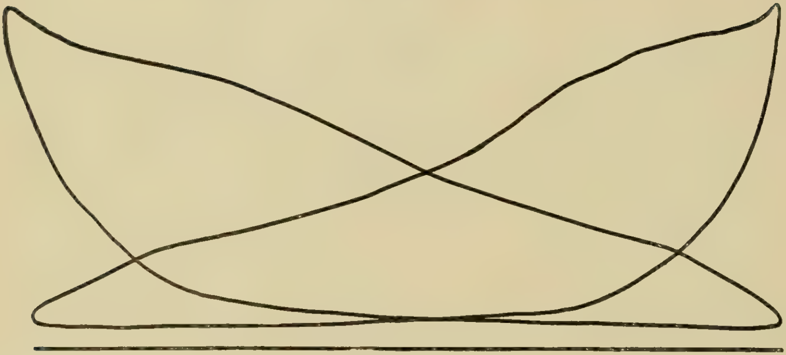


Fig. 1.

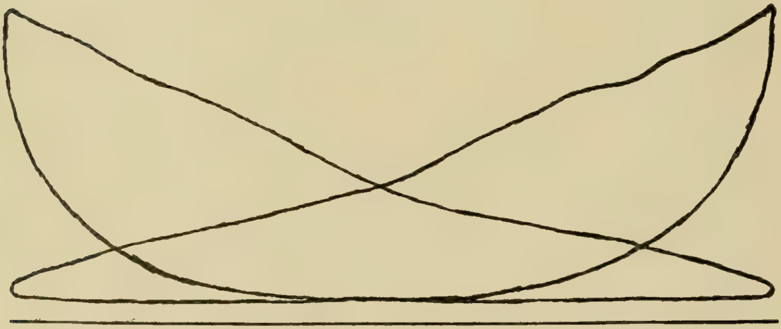


Fig. 2.

TRUE STEAM ECONOMY is in using the least quantity of steam possible necessary to accomplish a specific work at the desirable cut-off and in the least possible time, and therefore, through ability to operate a valve movement on locomotives at any required rotative speed, it is possible to secure the highest known steam and fuel economy obtainable in any simple engine, whether stationary or on a locomotive, and superior to any known type of compound high speed automatic stationary engine or any existing compound locomotive, solely because of the simultaneous increase of the ratio of expansion and reduction of the volume in compression, and which makes possible a great reduction in the percentage of cylinder clearance below that of any other known practice and still maintain 5-16 inch striking distance in each end of the cylinders of the locomotives, and in doing these things necessarily reduces the loss from cylinder condensation, and it is my opinion that we will realize the highest efficiency in the compound locomotive when the compound locomotive is equipped with a valve gear which will permit of a reduction of cylinder clearance from eighteen per cent. and over in the high pressure cylinders to six per cent. and less, and reduce the cylinder clearance of the low pressure cylinders from twelve per cent. and over to four per cent. and less, and then we will have in the compound locomotive a quick, free moving and economical machine, and one that will drift with the same freedom as certain other locomotives, which accumulate practically no compression whatever when drifting at high speed, and with reverse levers in or close to the center notch of the quadrants.

At the same time we must not forget that the conditions of service to be performed must have thoughtful consideration in determining whether or not that is the place for the compound locomotive, for the compound locomotive is not a panacea for all the ills presented by the startling figures as to the annual cost of fuel for locomotives, as previously given, for there are locations and plenty of them where the simple locomotive with a valve gear yielding correct steam distribution will excel in steam, fuel economy, even the compound locomotive equipped with the same gear.

Best results will always be had when we keep close to the very simple laws which govern the use of steam in the development of power, and which we all may know by patient individual thinking.

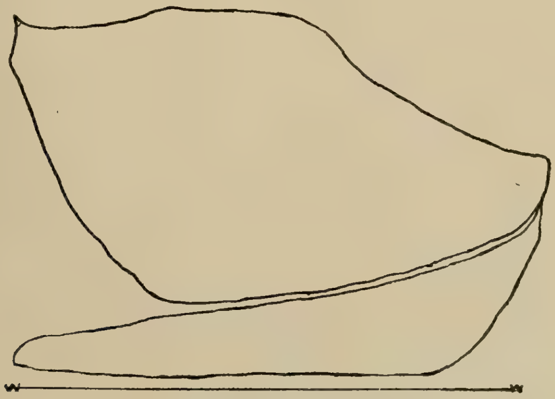


Fig. 3.

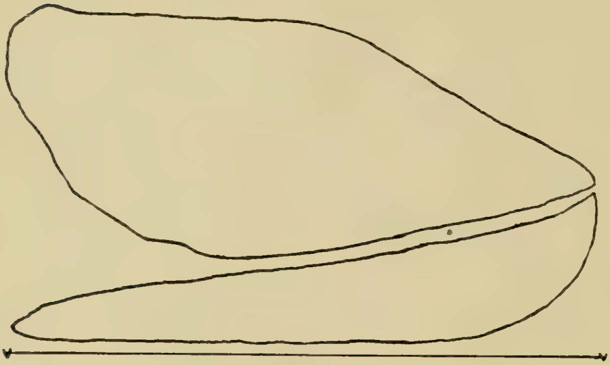


Fig. 4.

In figures 3 and 4 are shown two enlarged diagrams or indicator cards, one from a well known type of compound locomotive, the other from a compound automatic stationary engine. The atmospheric line on the stationary engine card has been drawn as on the simple cards to indicate same back pressure as in locomotive practice, otherwise the cards, figures 1, 2, 3 and 4, are exact enlargements of the originals.

Which is which, Figures 3 and 4?

There is no question of the advantages of compounding cylinders in using steam. If you will go into your power houses for generating electricity for your lights and for moving your street cars you will see that they have selected Compound Triple and Quadruple Expansion engines because of the known economy that follows compounding, and have selected designs of the highest known efficiency. It is a fact that the single expansion Corliss engines in proper working order possess a degree of economy that is slightly in advance of the established economy of the compound automatic high speed engines; and this is not due in the least to the question of high rotative speeds; it is due entirely to the early closing of the exhaust port in the high speed automatic engines, which is inseparable from the valve gear employed.

There is a great distinction between the term "Compression" and the term "Volume in Compression." As the term compression is ordinarily used it relates exclusively to the terminal pressure of compression; that is, the final pressure at the end of the stroke. Volume in compression has reference to the volume of vapor and atmosphere that is confined within the cylinder, the striking distance and the port at the time the exhaust valve closes. If you will take your pencil and paper and compute the clearance necessary to accommodate the terminal of compression as in figures 3 and 4 when the exhaust valve has closed when the piston is within 40 per cent. from the end of its stroke you will easily determine that in such conditions you must have at least calculation 18 per cent. cylinder clearance in your high pressure cylinder. Under conditions that are shown in the diagrams in Figures 5 and 6,

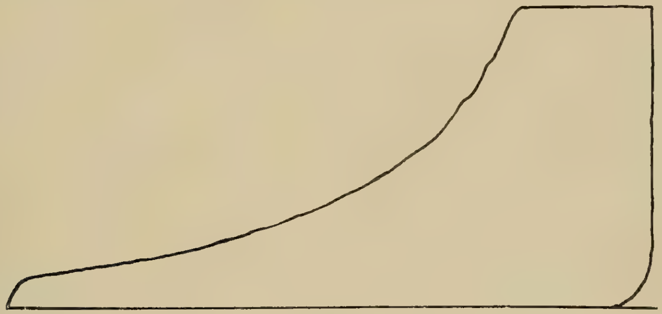


Fig. 5.

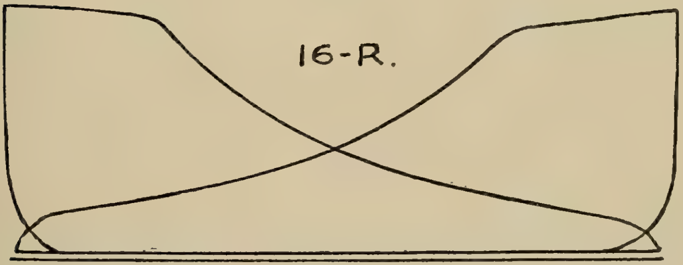


Fig. 6.

Figure 5 is from a Corliss stationary engine and figure 6 is from a locomotive, the valve gear does not close the exhaust port until the piston has completed ninety per cent. of its return stroke. You will find in compounding the cylinders that you will not require six per cent. cylinder clearance in the high pressure cylinder in order to keep the terminal pressure of compression below the steam chest pressure.

To substantiate the statement I make in regard to the requirements of cylinder clearance in any known type of compound locomotive in us to-day see Diagrams 3 and 4. I will refer you to a communication published in a recent issue of the Railway Age by Edward Savage, the chief engineer of the Northern Railway of France. I will also refer you to the proceedings of the New York Railway Club for Septembr, 1904, to the remarks of Mr. Vauclain of the Baldwin Works. The valve gear delaying exhaust opening and closure makes possible an entirely different design of locomotive cylinder and in which the radiating surface of the ports is reduced in excess of 70 per cent. This design also enables a better protection and insulation of the steam, and all of which contributes to the reduction of one of the great losses in operating any type of steam engine, namely, cylinder condensation, and by prolonging the expansion period you necessarily increase the ratio of expansion and you add to the positive work in the forward movement of the piston. It is a self-evident proposition that it requires more power to compress 3300 cubic inches of steam and air of a given initial pressure to a given terminal compression than is required to compress 1100 cubic inches from the same given initial pressure to the same given terminal pressure. By decreasing the volume to be compressed from 3300 cubic inches to 1100 cubic inches, you decrease the negative work in that same ratio and you add that much more to the positive, the earning side of the engine.

There are in operation to-day on one of the eastern lines two locomotives of the Atlantic type, of the same specifications, except as to the steam distribution. The cylinders of both locomotives are 19x26. The one has the usual Stevenson link motion and when cutting off at seven inches of stroke opens the exhaust port at 16¾ inches of stroke and closes the valve on the opposite side of the piston for compression when piston is 9¼ inches from end of its stroke. The other locomotive with the same size cylinders has also the usual Stevenson link motion but is equipped with a supplementary valve motion, which has been mistaken for the Walschaeot valve gear. When this locomotive cuts off at 6½ inches of stroke, she exhausts at 22 inches of stroke and closes the port for compression when the piston is within three inches of the end of the stroke. Anyone would naturally expect the latter engine, as she does, to develop a greater amount of power from a less quantity of steam admitted to the cylinder. There is a locomotive of this latter type in operation on one of the western lines running against simple locomotives of the same specifications except as to size of cylinder and steam distribution, and also against four cylinder compounds also of same general specifications. The cylinders of the one locomotive of which I speak are 20x28. The cylinders of the simple locomotives are 21x28, but the locomotives are of the same specifications otherwise. The locomotive with the 20x28 cylinders pulls trains up a 2 per cent. grade that the 4 cylinder compounds and 21x28 simples cannot take over the hill without doubling. On another western line one of these locomotives is running against simple locomotives of the same specifications, and also against four cylinder compounds. It is stated by officials on that line that this one locomotive with the delayed exhaust events will haul 200 tons more per train than either the simples or the compounds, and shows a marked decreased consumption of water and of coal. All of this is due entirely to what I have just said with regard to increasing the ratio of expansion, decreasing the volume of negative work by delaying the opening and closing of the exhaust, and which reduces the cylinder clearance, and all of which correspondingly reduces the demand on the boilers for steam to supply the cylinders.

PRESIDENT: Would any gentleman like to ask any questions or make any remarks?

MR. F. M. WHYTE: Mr. Chairman—Will you allow me the floor for just a moment? It frequently happens that the motive power department of a railroad is approached with a proposition to save a certain percentage of the coal bill, say 10 per cent. That is a proposition which a man should hesitate quite a while to make and it is a proposition which the motive power department officials cannot afford to pass over lightly. Assuming that the coal bill of a railroad company for a year is $2,000,000, a saving of 10 per cent. means a saving of $200,000. The motive power men are looking for this saving. They are looking for even smaller ones than this.

It is rather difficult to find in the cylinders an opportunity for much of a saving, and some of the reasons are as follows: Locomotives have to be kept under fire at terminals,, waiting at stations, and for other causes, and it has been found that the coal used during the time of standing at terminals and at other times when steam is not being used in the cylinders, is 20 per cent. of the total coal used. It has been found further that of the coal put into the fire box 50 per cent. of it is lost, the heat from this part goes up the stack, is radiated from the boiler, etc. Then during the time the cylinders are using steam, only 50 per cent. of the coal bill goes into the cylinders; that is 50 per cent. of the other 80 per cent. In addition to these items is the steam used for heating the train, for heating water in tender, steam for driving air pumps and for leaks about boiler and cylinders and the discrepancy between amount of coal paid for and the amount which is actually placed on tenders, none of which items can be affected in the least by the valve motion.After deducting the total of these various items there remains a comparatively small percentage of the total coal bill which can be affected by the valve motion.

MR. IRA C. HUBBELL: I would like to say just a few words in response to what has been said by Mr. Whyte. I spent a good many years of my life selling stationary engines for a living. I learned, after having my head "bumped" a few times, that there was a whole lot about the use of steam in the cylinder of an engine that I didn't know anything about, and I thought a good deal of my head and "got busy" doing a little individual thinking and study, and I found by a large number of tests conducted upon the Corliss simple engine making the diagram as shown in Figure 5 it showed a steam economy over the ordinary automatic type of stationary engines, like the cards Figures 1 and 2, as 26 lbs. is to 32 lbs. of water per indicated horse power hour. These results being obtained by passing the exhaust of the stationary engines through surface condensers and weighing the condensation. I have with me some figures taken from the proceedings of the Western Railway Club, for, I think December, wherein information is given with regard to the water consumption of the four cylinder balanced compounds on the C. B. & Q. in July as compared with a simple locomotive. The water rate of the simple was given at something over 30 lbs. The water rate given of the four cylinder compounds under the most favorable conditions is given at a fraction less than 23 lbs.

There has been in use on one of the railroads entering Pittsburg since March, 1904, a locomotive whose steam distribution is like the pair of cards in Figure 6. I have a series of indicator cards from that locomotive as well as one from a sister locomotive of the same specifications, except as to steam distribution, and making no allowances for differences between temperatures of 212 and the temperature of the water in the tank, for leaks or losses or water and steam used by the injectors, the one locomotive shows a water consumption, as I recall it, ot about 30½ pounds per indicated horse power; the other locomotive with delayed exhaust and closure shows a horse power development of a fraction less than 25 lbs. of water. It is a well known fact, as stated by Mr. Whyte, that a large portion of the coal consumed by locomotives is consumed while they are standing on side tracks. There is no question with regard to that being true. Whether it amounts to 20 per cent. or not I am not prepared to say. Accepting all of the figures as presented by Mr. Whyte as correct, it is well worth the thoughtful consideration of our railroad men to save $80,000 per year of our coal bill, I think.

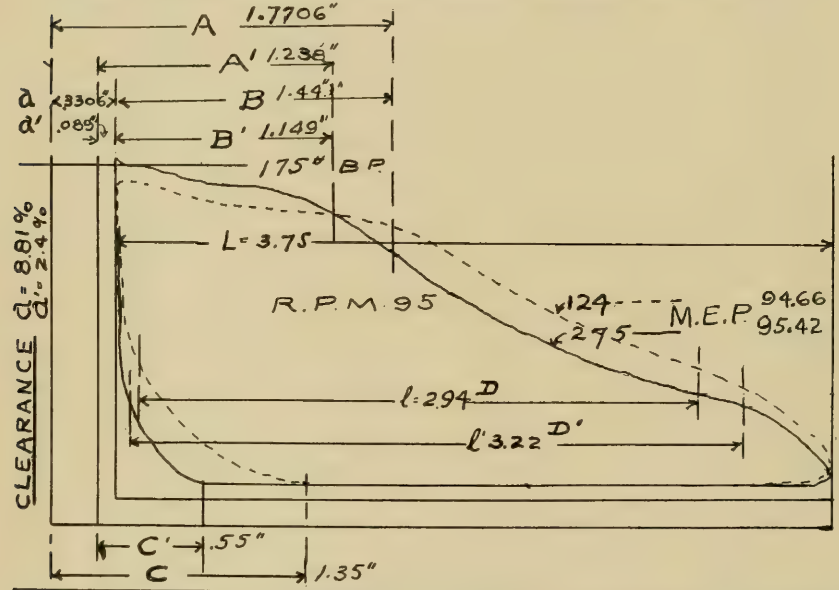
One very important point, and the vital one, has been overlooked entirely, and that is in this statement of the fact:

By increasing the ratio of expansion and by decreasing the negative work of compression you must increase the amount of power developed in any given cylinder, and it is proven wherever the locomotives are in use with the steam distribution as shown by diagram Figure 6, that they will move greater tonnage and at a decreased consumption of both water and coal, than a simple locomotive or than the four cylinder compounds where they are in operation in comparison with an open field and no favors shown any, and it seems to me that that is the best answer to the whole proposition.

MR. F. M. WHYTE: May I ask Mr. Hubbell a question? I would like to make a mark on his diagram, if he will allow me. We will assume that this is the compression back pressure line of the ordinary valve motion, whereas this card is the compression in volume shown by that line. Is it not true that this expansion line would be outside there (indicating), and is it not true that we have gained in here what we have lost in these less the cost

I will say of the changes of power that is compressing this steam and what we gain out of it in expansion?

MR. HUBBELL: I would like to answer that by showing a pair of diagrams that I have with me as shown in Figure 7.



CUBIC INCHES OF STEAM ADMITTED TO POINT OF CUT OFF INCLUDING CLEARANCE.	275	2698.754
	124	3774.498
CUBIC INCHES OF STEAM ADMITTED PER POUND OF M.E.P (INCLUDES CLEARANCE)	275	28.283
	124	39.768

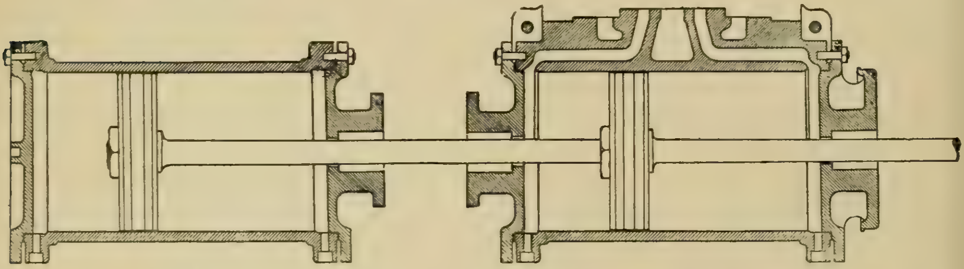
On this card is presented a pair of diagrams that show the fair average working cards taken in the test from which I have just given the information with regard to the water consumption of the two locomotives in the Pittsburgh district. The dotted diagram is from a locomotive with the usual Stevenson link motion. The full line diagram you will notice is like those in Figure 6. The mean effective pressure of the dotted line diagram is 94.66 lbs. The mean effective pressure of the full line diagram is 95.42 lbs., showing a greater mean effective pressure from a much less quantity of steam which the boiler is called upon to supply, and which is due entirely to delayed exhaust opening and closure and reduced clearance. The mean back pressure of the dotted diagram is 16 lbs.; the mean back pressure of the full line diagram 10.78, and yet the line of back pressure is exactly the same in both diagrams up to the closure of the port for compressure. The reduction in the mean back pressure is due entirely to the decrease in the negative work of compression, due entirely to the decreased volume in compression. If you will consider the difference in cylinder clearance of the two engines and will take the time to compute the quantity of steam necessary to fill the clearance and cylinders up to point of cut-off you will find that for each pound of mean effective pressure in the dotted diagram the boiler is called upon to supply 39,768 cubic inches of steam per pound of mean effective pressure realized in the cylinder of the engine. In the other diagram, due to the increased expansion and decreased negative work of compression, only 28,283 cubic inches of steam are required per pound of mean effective pressure realized in the cylinder. Speaking of the effect of cylinder clearance, that is the volume of the port and the volume of the striking distance in cubic inches, upon the consumption of steam by a steam engine, Mr. Thomas Pray, Jr., of Boston, says in page 32 of Volume 1 in "Twenty Years With the Indicator": "Whatever amount of clearance is found in an engine is a constant quantity that must measure out an amount of steam, which does no good beyond filling a certain amount of dead room at every revolution of the engine.

"As steam is a fluid which is capable of measurement just as much as water or milk, do not allow an engine builder to talk you into the use of a large clearance, by any roundabout method of argument; for if you are using a cut-off engine, the amount of steam wasted in the clearance must be filled with live steam, while the valve is open, and the ratio of expansion has nothing to do with it. The amount of steam which you measure out in this way is for each end of revolution, and the waste is therefore as many times the excess of clearance as your engine makes strokes per day, month or year."

I have proven his statement as above to be true—and the late Mr. William Houtaling says in "Steam Engine Indicator and Its Appliances":

"The amount of clearance in an engine is an important factor and is always considered in the study of steam economy as a source of loss, therefore, in the designing of the various styles of engines, it has always been one of the principle intentions of engine designers to construct them with a view to reducing the clearance to a minimum and thereby saving (in a measure) the amount of steam required to fill large clearance spaces."

These quotations and which my personal experience of several years' active relations with the use of steam by various types and classes of steam engines justify, fully meet Mr. Whyte's reference to the possible realization of benefit in the expansion line from the accumulated pressure in compression. Were the facts other than as stated by Messrs. Pray, Houtaling and other able engineers, it seems to me the condition presented would tend to establish that we had found that for which many a man has hunted, i. e., perpetual motion without if it be true, that you can nullify the demands on the boiler to fill port and striking distance, Volumes—Clearance—with Compression, and without any demand on the boiler for steam to do the necessary work of compression, then why not go a step farther and secure enough more compression to equal the cylinder volume up to and including the point of cut-off by an arrangement of cylinders something like that shown in Figure 8?



If the logic is good in the one case, it is equally logical in the other, but unfortunately compression is negative work and is always a loss, but when the volume in compression is reduced to a minimum, and this is regulated wholly by the valve gear, then compression is best utilized for the legitimate purpose of a cushion at end of the stroke, and with the loss of compression minimized as in this manner, compression is a useful servant in the operation of an engine.

This is the great reason for the well known steam economy of the Corliss Engines, and the locomotives herein referred to and as exemplified by the diagrams Figures 5, 6 and 7.

PRESIDENT: It is getting late, and if there are no others who would like to speak upon the subject, a motion to adjourn would be in order.

ON MOTION. Adjourned.

EDWARD KERR, President. W. R. BROWN, Supt. G. W. GOSSER, Sec'y and Treas.

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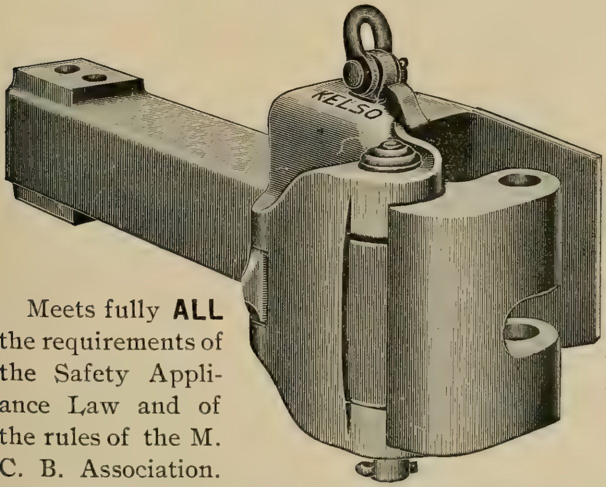

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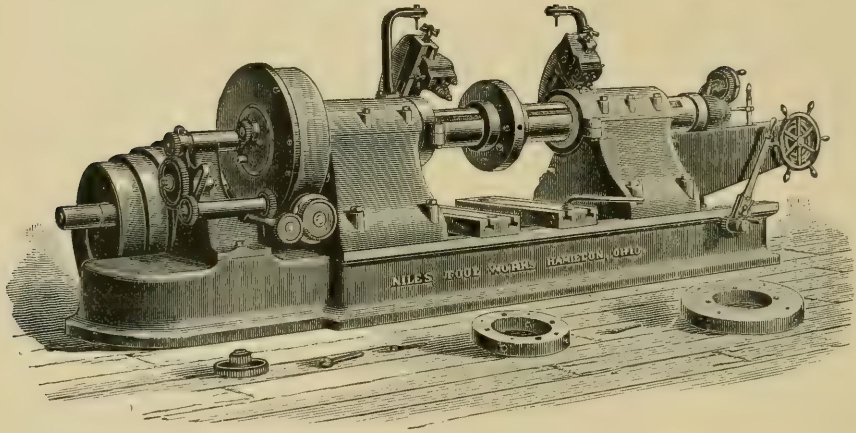
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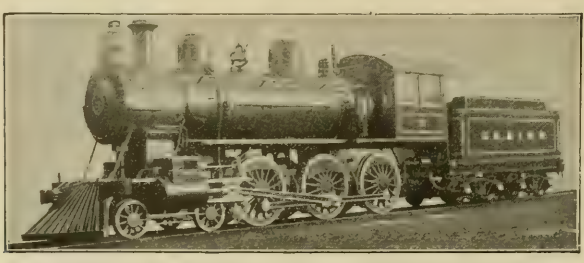

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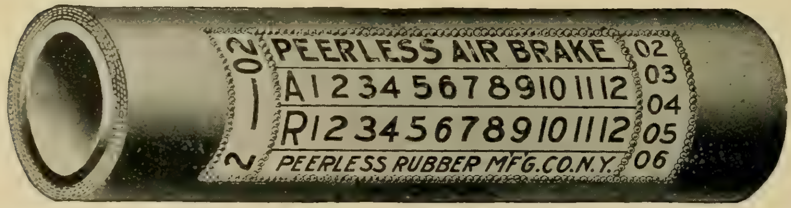
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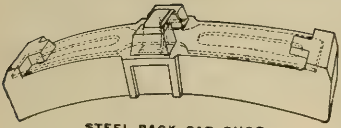

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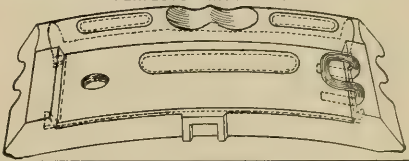

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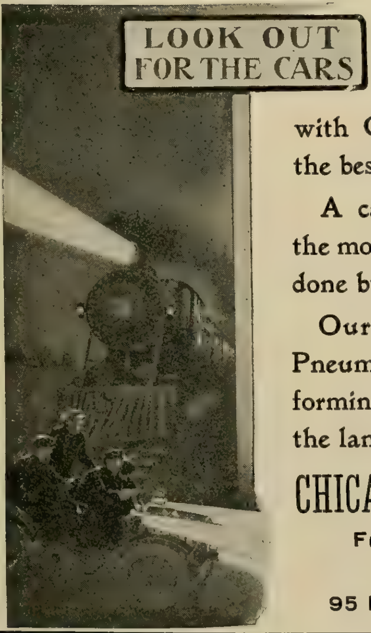

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THE NATIONAL MALLEABLE CASTINGS COMPANY

CLEVELAND CHICAGO INDIANAPOLIS TOLEDO SHARON

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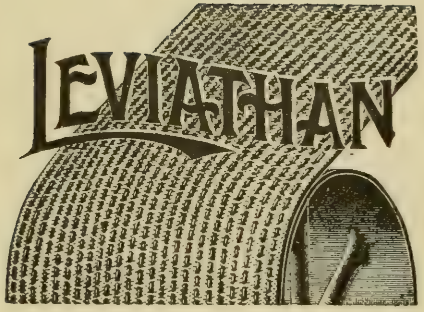

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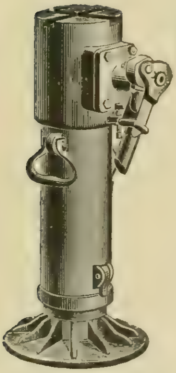

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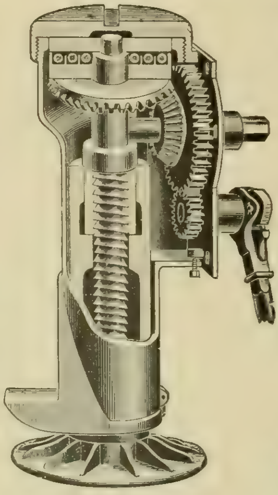

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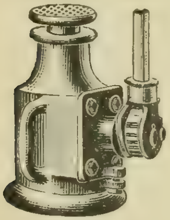

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OFFICIAL PROCEEDINGS
of the
Railway Club *of* Pittsburgh.

ORGANIZED OCTOBER 18, 1901.

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Supt. Motive Power, P. & L. E. R. R., Pittsburgh, Pa.

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Chief Clerk, Supt. M. P., General Offices P. & L. E. R. R., Pittsburgh, Pa.

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Pittsburgh, Pa.

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Superintendent Transportation, P. & L. E. R. R., General Offices,
Pittsburgh, Pa.

F. H. STARK,
Superintendent Rolling Stock, Pittsburgh Coal Company, Coraopolis, Pa.

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Meetings held fourth Friday each month, except June, July and August.

PROCEEDINGS OF MEETING,
FEBRUARY 24th, 1905.

The meeting was called to order at 8 o'clock P. M. at the Monongahela House, Pittsburgh, Pa., with President L. H. Turner in the chair.

The following gentlemen registered:

MEMBERS.

Anderson, H. T.
Barnsley, Geo. T.
Bell, W. K.
Brittain, John B.
Brown, E. W.
Brown, John T.
Coates, H. T., Jr.
Conway, J. D.
Courtney, D. C
Dambach, C. O.
Decker, O. S.
Ditchfield, F.
Dow, G. N.
Dukesmith, F. H.
Dyer, J.
Foller, Chas. S.
Forsberg, R. P.
Gearhart, J. A.
Grooms, J. C.
Grove, E. M.
Hall, W. G.
Halleran, H. J.
Hastings, C. L.
Hempstead, J. G.
Henderson, J. Wesley.
Horner, Jas.
Howe, D. M.
Hughes, J. E.
Hunter, H. S.
Jennings, F. R.
Johnson, A. B.
Kearney, Alex.
Keppel, A. M., Jr.
Kinter, D. H.
Knight, E. A.
Lee, L. A.
Lindstrom, C. A.
Long, R. M.
Mason, Stephen C.
Milligan, John D., M. D.
McNaugher, Jos. M.
McNulty, F. M.
Porter, H. V.
Poster, Samuel.
Quest, W. O.
Reese, E.
Richardson, W. P.
Riley, J. W.
Safford, J. B.
Sattley, E. C.
Smith, D. W.
Spangler, C. P.
Sproat, H. H.
Stark, F. H.
Stone, W. A.
Sweeley, G. P.
Terry, W. A.
Thomas, Chas.
Thomas, I. B.
Tucker, John L.
Turner, L. H.
Warnock, H. R.
Wendt, Edwin F.
Wilson, W. J.

VISITORS.

Anderson, G. E.
Boyd, John L., Jr.
Crooker, Ralph, Jr.
Mathiott, G. S.
Nicholson, S. H.
Oliver, W. H

Crutchfield, J. S.
Dickerson, S. K.
Edsall, C. H.
Fenwick, A. C.
Graham, W. C.
Haas, I. I.
Hill, R. T.
Hurd, D. F.
Irvine, Samuel.
Jones, John H.
Kitzmiller, E. A.
Klein, Samuel J.
Kress, F. J.
Logan, Col. Albert J.
Orr, J. W.
Pearson, Frank R.
Riddell, W. A.
Ross, Wm. J.
Shaw, Col. D. C.
Simonds, G. L.
Slemmer, J. C
Smith, Sion B.
Snodgrass, Edward, Jr.
Stafford, B. E. D.
Thomas, A. C.
Walker, Geo. G.
Wardrop, J. W.
Woodside, S. P.

President—Gentlemen: The first order of business should be the reading of the minutes of the last regular meeting, but as they are now in the hands of the publisher if there is no objection they will stand approved.

Secretary J. D. Conway then read the list of proposals for membership, as follows:

Bennett, H. R., Material Inspector, P. R. R., 1013 Penn avenue, Pittsburgh, Pa.

Knox, Wm. J., Chief Draftsman, B., R. & P. Ry. Co., care of B., R. & P. Ry. Co., DuBois, Pa.

Metcalf, Wm., President Braeburn Steel Company, Braeburn, Pa.

Neilson, Geo. H., General Superintendent Braeburn Steel Company, Braeburn, Pa.

Redus, Avery E., Supervisor Pittsburgh Car Service Association, Westinghouse Building, Pittsburgh, Pa.

Shults, F. K., Eastern Sales Agent Camel Company, 95 Liberty Street, New York City, N. Y.

Stafford, B. E. D., General Manager, Flannery Bolt Company, Pittsburgh, Pa.

Taylor, J. W., Expert Department, Crucible Steel Company of America, 1404 Frick Building, Pittsburgh, Pa.

Calvert, J. E., Chemist, P. & L. E. R. R., 293 Butler Street, Etna, Pa.

President—As soon as these names have been favorably passed upon by the Executive Committee the gentlemen will become members.

Secretary Conway then read the following appointments of members to act as the committee authorized at the last meeting to act in conjunction with similar committees from kindred organizations, such as the Engineers' Society of Western Pennsylvania and the Traffic Club, looking to the securing of joint permanent quarters, as follows:

F. H. Stark, J. D. Conway, R. A. Bole, J. D. McIlwain, J. L. Hukill, Committee.

President—The paper for the evening will be upon "Freight Claims." I suppose there is no subject which is so annoying to the traffic men and the shippers generally as this subject. Mr. W. A. Terry, General Freight Agent of the P. & L. E. R. R., has kindly consented to present this subject to the meeting.

FREIGHT CLAIMS.

By Mr. W. A. Terry,
General Freight Agent P. & L. E. R. R. Co.

Mr. Chairman and Gentlemen of the Railway Club:

I am very much in the position of the man who was accused of never opening his mouth that he didn't put his foot in it. My foot is, metaphorically, in my mouth to-night, as a consequence of "butting into a discussion" on relationship between the shipping world and the railroads at a meeting of the club in December. Your chairman has asked me to talk on the subject of Freight Claims. The subject covers so wide a range as to make the briefest mention of incident and possible suggestion or two all that a single paper would permit. The subject is rather a difficult one to talk about; there are so many unsettled and almost unsettleable responsibilities as between the shipper and the carrier that the will to be fair and just on the part of either party is put to a severe test. In the main, both the shipper and carrier are undoubtedly disposed to be just in freight claim matters. We must grant to each, however, the full recognition of all the equities, in each case not forgetting those disarrangements which losses and instances of damage very often cause. A plant is idle for want of a piece of machinery, which, upon arrival, is found to be broken and unfit for use. The delay in operation of that mill causes a loss not only to the operator, but also to many who are dependent upon its product. The carrier, on the other hand, feels that his hardship has been great in the necessity for payment of the amount of loss, representing the invoice value of the article. Each party has sustained a loss—the consignee in the failure to operate his plant, the carrier in the value of the lost article. It is an equitable distribution of one of the burdens which fall to the great industrial world in its effort to promote the growth of commerce and market its output in which manufacturers and carriers are equally interested, equally benefited and equally responsible.

The carrier, refusing to bear his just share of the responsibilities after having enjoyed his share of the benefits (in freight earnings), could with no less reprehensibility repudiate any just debt or contract, and the patron endeavoring to collect not only the amount of actual loss, but also an additional amount to represent the loss from failure to operate a plant—in other words, to put his share of the commercial burden upon the shoulders of the other party—is indulging in a species of littleness which can have no other effect than to promote contest and postpone close co-operation.

Nor does the duty of either party end here. We are, both shipper and carrier, working in a common interest toward a common end—the production and delivery of the greatest possible amount of business at the minimum of loss and maximum of benefit. It is, therefore, of equal interest to both that every precaution be taken from the beginning to prevent loss or damage. In this the producer has much the advantage of the carrier, for the reason that from beginning to end of the process of production the work is under control of those in authority who can ensure the proper packing and loading—but with the carrier the movement of the freight takes it through so many hands as to make it practically impossible to locate responsibility among its men for an instance of damage. The introduction of air brakes on freight trains—a wonderful stride forward on the part of carriers, with benefits beyond computation to producer in the possibility of greater speed and quicker deliveries—has increased the carrier's burdens greatly. The sudden stops cause contents of cars to tumble one package over another in defiance of the best methods of loading on part of either carrier or producer.

The use of the automatic coupler has removed the one condition formerly necessitating care in coupling cars—the human hand—and again the best management or system for the careful handling of freight is defeated by the carelessness of trainmen and those accidents and misfortunes which attend the switching of cars in and out of trains by the most careful of trainmen.

The loss and damage paid to-day multiplies that paid a few years ago many times. A certain portion of this great increase is due to the natural increase in business, but a much larger proportion is due to these steps in advance—the consequence of the use of the air brake and the automatic car coupler.

It is therefore the duty, and should be the aim, of the producer to meet these new conditions as all new conditions should be met—by corresponding provision for safe carriage in the way of packing. It is unfortunate that all producers do not realize their own responsibility in this particular, and are to-day offering carriers freight improperly and insecurely packed and endeavoring to reduce their own expenses by increasing the carrier's risk. The carrier may refuse to accept the shipment if he chooses, or he may decline to pay the claim for such losses; but in either case it does not fail to cause dissatisfaction and often contest,which both producer and carrier should avoid and which can be avoided if each party will perform his part faithfully—the producer as to packing and the carrier as to transportation. Failures due to error may be overlooked, but fail due to an apparent intent to take unfair advantage cannot fail to provoke resentment, and certainly a resistance as stout as it is just.

The responsibility for damage is not always easy to locate, and absolute fairness on the part of the heads in charge of the business of either the carrier or the shipper will not always solve that difficulty. Some months ago I was convinced that in the matter of handling acid carboys there was a great deal of loss in the way of breakage that the carrier was not responsible for; and yet we had been paying claims for anywhere from two to a dozen carboys in a single carload shipment of empty carboys being returned for loading. The most careful investigation failed to develop any reason for that breakage, so far as the carrier was concerned. Each shipment was followed with the greatest watchfulness, in order that a possible case of rough handling might be found before taking any positive position in refusing to pay further claims for such losses. After following up a number of such instances and finding that there was absolutely no case of rough handling from the time shipment was received from the shipper until it was delivered at destination, I arranged with the agent at the shipping point to go to the shipper's place of business and examine the carboys as they were put in the cars, and make a note of every broken carboy, if any, put in the car. I then arranged with the agent at destination to watch the checking out of this car and make similar record. Neither agent knew of the action of the other. The consequence of this was that instead of being asked to give a receipt for a given number of carboys as good carboys, it developed that of the ten shipments examined there were anywhere from two to a dozen carboys broken when loaded before being delivered to the carrier at all; and the check at destination developed that not a single additional broken carboy was added to the list. We had, as you will see, therefore, been handling carloads of carboys offered to us as intact and in good order, and so far as the chief in charge of traffic for that firm is concerned, he had no reason to doubt that the carboys were in good order when shipped,but the carrier was paying claims for breakage which occurred in the plant in the process of getting the full carboys emptied and the empty carboys loaded back in the car; and those shippers who are aware of the position taken by our company that we would not any further recognize any claims for broken carboys or for acid lost from broken carboys (except in the case of rough handling, such as wreck, etc.) will understand why we have decided that a glass carboy that in places is scarcely thicker than paper is in our opinion not a proper package for 260 pounds of sulphuric acid. I am not altogether sure what co-operations we are receiving on the part of shippers and users of sulphuric acid in the effort to correct what is as much a wrong against them as it is against the carriers; but if they take the proper position they will recognize that a carboy of that character is absolutely unfit to be used in transporting business, and will join heartily in our effort to demand a better character of package, and thus avoid the losses either to themselves or to the carrier.

And not only should the commodity intended for transportation be securely packed, but of the greatest importance is it that the loading of such shipments as are loaded at plants by shippers be carefully watched by competent men, in order that any damage due to the quick stops and sudden jars incident to modern freight transportation may be avoided. There is great room for improvement along this line on the part of shippers, and carriers are entitled to all the co-operation possible for shippers to give. Both the producer and carrier have difficulties hard to overcome, and it is particularly so in the case of the carrier owing to the fact that in contracting to transport freight between two points it is necessary for two or more roads to be used. If only one road were involved the difficulty would not be great, but the officers of one road have absolutely nothing to do with the management of the other and no control over it. Each particular group of officers, therefore, may represent a separate and distinct view or policy, and possibly not at all in harmony with each other.

Much has been done in the past few years to bring the different roads into uniformity, but much yet remains to be done before the carrier will be in position to handle with greatest facility all the cases presented for adjustment. When you consider how different are the methods of the different roads and the wide range of variation in their policies, you will agree that the achievement of the Freight Claim Agents' Association in the way of providing a common method for the handling of matters pertaining to freight claim adjustment is a great step in advance. This is supplemented on the larger systems by so-called family rules, under which one road makes immediate adjustment and pursues the work of investigation afterward. When you consider the methods which prevailed a few years ago, under which a claim was always investigated (and that with no undue haste), and authority for charge for each road obtained before the claim was paid, and compare it to the methods which prevail to-day, under which claims for known loss and damage are paid immediately and the investigation and authority for charge obtained afterward, you must agree that the carriers have already overcome many of their difficulties.

A most difficult thing to handle is the claim for concealed loss and such losses as are not noticeable upon delivery. There is opportunity for injustice here on the part of either party. The damage may be caused by the carrier or by the drayman before delivering to forwarding carrier or by drayman hauling from delivering carrier to consignee's house, or it may occur in either the house of shipper before forwarding or consignee after its receipt, but the damage not being apparent, carrier at destination delivers it to the drayman and a receipt is taken without exception. Upon opening package at consignee's house and the damage is discovered, the point then is to determine who damaged the shipment.

As an illustration: A shipper in Minneapolis offered one of the roads leading out of that point a consignment of showcases, boxed. The forwarding carrier gave a receipt as in apparently good order; shipment was forwarded to Pittsburgh in apparently good order; delivered to consignee's representative in apparently good order, and a receipt taken by him on exactly the same conditions. The shipment was hauled by consignee's carrier five miles over the streets of Pittsburgh and unloaded at consignee's house. Upon opening the box the showcases were found to be broken. Consignee insisted upon payment of the value of the showcases, which we declined on the ground that the shipment had been delivered to him under exactly the same condition as forwarding carrier had receipted for it at originating point, and that the damage was just as likely to have occurred after it had been delivered and receipted for in Pittsburgh as prior to that time. The case was taken before a 'squire and judgment obtained. It was afterward taken to court, and notwithstanding the fact that we had a receipt from consignee's representative receipting for the shipment exactly as the forwarding carrier had receipted for it to the shipper's representative, and notwithstanding the fact that in addition to the two dray hauls there were at least four roads interested in the haul—that court decided that the P. & L. E. R. R. was responsible for that breakage. How they could arrive at such a conclusion is beyond my comprehension.

A shipper presents a box described as a case of wine. The carrier receipts for it. Upon delivery it is found to contain water. Consignee claims evidence of tampering and presents claim for loss on the ground that while in possession of carrier the package had been opened and contents replaced by water. That such cases could occur on part of trainmen or warehousemen or carrier is possible, but the opportunities for such work are so few that such instances would be rare.

Two or three years ago an Italian at Hillsville presented a claim for the contents of a box alleged to have contained his personal effects, but which was short at destination and not located by us. The amount was in the neighborhood of $100, and to his claim was attached an itemized list of the articles in the box and an affidavit in support thereof. Months after that one-hundred dollar claim had been paid we found the box at Coraopolis. Upon opening it we found one pair of badly worn, patched and soiled overalls, a pair of boots that would not shed water and a shirt which could have been bought new for 75c.

Innumerable examples of efforts to take advantage of the occasion of lost packages to magnify claims could be cited, and while this practice does not generally prevail with the larger shippers, still there are instances even with them that they do the carrier injustice, and at the same time discredit themselves by taking advantage of the misfortune to force upon a carrier a greater share of the burden than the relationship warrants. No more than the actual intrinsic loss should ever be charged against a carrier as its share of the burden in the joint effort to get the maximum production delivered. Shoes at $5.00 per pair which cost $3.00, dishes at $60.00 per set which can be duplicated at $25.00, clothing at $10.00 a suit and worth $4.00, coal at $2.50 a ton when sold at $1.75, coke at $4.50 per ton when it could be bought anywhere in the market for $2.50—are all of the same class—an effort to take advantage of the carrier's misfortune on the part of those from whom the carrier should expect and has the right to expect fairness and co-operation.

The classification states that such articles as silver, etc., will not be taken as freight, and to that list should be added one other commodity, "tender association." Carriers are frequently called upon to pay for articles at three times the actual value owing to the very tender association which surrounds the particular article in the heart of the claimant. We are willing to pay for losses for such commodities as we lose at their actual value. We cannot honor claims for "sentiment."

Another class or character of claim presents great difficulty in adjustment. A shipment is loaded by shipper at Pittsburgh and forwarded to New York City. Upon arrival there the consignment is delivered to consignee, who receipts for it, and so far as delivering carrier is concerned the transaction is closed. Weeks after the shipper at Pittsburgh presents to forwarding carrier claim for damages, claiming that the shipment had been wet en route. Now, in the first place, in placing cars for loading at the various plants it is not always practicable to give cars such inspection as would always determine whether roofs might not leak at obscure points, and the responsibility for loading such a car must rest with a shipper to a very large extent; but setting this point aside, the papers in the claim are forwarded to the claim offices of the roads interested and are returned by the delivering carriers, advising that not only was the shipment receipted for in good order, but up to that moment not one word of information or complaint had been given them that there was discovered any damage after car and package had been opened and no opportunity given delivering carriers to verify condition for his own record or take any steps toward an investigation.

Therefore there is nothing left to do but to decline the claim. The declined claim is sent back to forwarding carrier, who presents the situation to shipper. Shipper returns his claim and insists upon payment, stating that he has been compelled to make allowance to consignee in his settlements. Now, here you have a case where either shipper or carrier is loser the amount of an alleged damage. The most reliable of shipping firms have some very untrustworthy consignees. We don't deny the veracity of consignee, although we may have doubts about it in spite of that much misused and discredited document, the affidavit. Whose responsibility is it now? And who should bear such a loss? Going on the ground that the damage was a fact, and setting aside the question of responsibility for loading an alleged leaky or defective car, the forwarding carrier has absolutely no way of taking care of it. His connections decline to have anything to do with such a case. They say that as it was receipted for as in good order, and as no notice was ever given to the contrary afterward, then the damage must have occurred after it had passed into possession of consignee.

Now, without considering any self-interest, but treating this case as all these joint difficulties should be treated, what should be the procedure? The claim has been presented to forwarding carrier, who is advised by his connections that no damage existed up to time of delivery. Consignee has said that he received it all right and in apparent good order, and at no later time had he corrected this statement by a notice of a later discovery.

Claimant has made the allowance in settlement with the intention of making claim on carrier.

He allows the loss, but intends to make someone else pay for it. Now, what equity is there in such a transaction? He hasn't any better information than carrier that any loss existed. He simply takes consignee's word for it. Is it good business? Hardly. It may seem good policy as between shipper and customer, but why force the carrier into a policy transaction between shipper and consignee? There is, I think, a fair way to handle such a case, and that would be for shipper, upon receipt of such a representation on part of consignee, to state the situation to carrier and ask for his co-operation by promptly informing him if such a loss was on record at delivering point. I'll handle it by wire if referred to me. If it was not, then shipper should be satisfied that the transaction was an effort to defraud carrier or shipper and should in his own interest refuse to allow such amount in settlement. There is no limit to which unscrupulous consignees could go in the handling of such cases if the shipper and carrier do not stand together in a demand for absolutely fair and square dealing.

Instances without number can be cited of claims just and unjust, avoidable and unavoidable. Instances of the indifference of the carrier on the one hand and the shipper on the other, each working to gain his point in the particular transaction without regard to the rights and equities of the other. Claims for overcharge due to errors in weights or rates, errors in figuring extensions, corrections for articles misdescribed at time of forwarding—many such claims are difficult of adjustment, but all adjustable nevertheless. But enough have been given to show that the closest co-operation between producer and carrier is as necessary to one as to the other.

After all, the claim question is only one of the incidents in the great business in which the shipper and carrier are partners, viz, the producing and delivery of the greatest possible amount of business at the minimum of loss and maximum of benefit, not for one, but for both. Let us not forget, therefore, that self-interest, though natural in all business transactions, should not be permitted to stand in the way of the full accomplishment of the larger purposes, and when self-interest enters too largely into these adjustments it does that very thing. What if it does cost a little more to properly pack a shipment —the cost of a loss by reason of improper package is greatly out of proportion to the cost of proper packing. What if it does cost a little more to properly mark a package, so that if astray it may quickly be forwarded and delivered to the proper parties? What if it does cost a little more to watch the loading and insure its security and safety during a journey under the modern conditions of transportation? The cost is slight in comparison with the losses which failure to do these things makes possible. Let us not be "penny wise and pound foolish." Let us not save one dollar at the loss of ten; let us rather face the facts that the profits of our business do not or ought not to come from any advantage in claim adjustment, and that every adjustment, whether of claim or a measure to avoid claims made on a reciprocal basis has done just that much to make the next adjustment easier to accomplish. A fair mind open to the equities of the other side seldom fails to influence a similar feeling on the part of the other party; toward this end the traffic representatives of both shipper and carrier should work. And yet I realize that there will be questions which, with the intention to be fair on the part of either party, will still be hard to adjust; no matter how closely we work, some responsibilities will be hard to fix.

Some time ago a suggestion was made at a meeting of this club that great good toward the development of Pittsburgh, particularly in its effect upon the relation between the public and the railroads, could be accomplished by the establishment of a commission, whose members should be selected from among the various railroad and industrial organizations. I have thought a good deal about that suggestion, and while not convinced that a commission so selected would or could accomplish what was expected of it, I am of the opinion that the shipppers and carriers could be benefited if there could be a committee of say seven, three representatives of the traffic departments of each interest and one party identified with neither—I do not mean that such a committee should have any power as to final adjustments beyond those given in the specific case. There are many cases where both parties to a question are blinded by self-interest to such extent as to make an adjustment as between themselves almost impossible. A disinterested recommendation from such a committee might supply just the right idea or basis which both parties could accept.

Speaking for the carriers, the question of how to avoid loss and damage is constantly before us, and every effort is made to avoid errors, or in case errors are made, to rectify them without loss if possible. If a loss actually occurs it is the intention to pay it promptly. In the midst of the avalanche of claims, just and unjust, it is not the desire of the carriers to avoid payment of a single just case.

It is to be hoped that with a continuance of the progress which has been made in the past on the part of both shipper and carrier will come closer relation between both parties and a gradual accomplishment of methods which will, first tend to avoid losses, and second, to adjust those which are unavoidable upon a basis equitable to both.

President—Mr. Terry deemed it wise not to take up too much time in order that the other side might have something to say, and I know no one better fitted to commence the trouble than Mr. Wardrop, of the Merchants and Manufacturers Association.

Mr. J. W. Wardrop—Mr. Chairman and Gentlemen:

Whenever the subject of claims comes up I think of the railroad, not more than a thousand miles from Pittsburgh, where a passenger on the train, an old gentleman with long, gray beard and bald head, was approached by the conductor and asked for his fare. He said: "I paid you." "Where did you pay me?" "I got on at Beaver Falls." "Why," the conductor replied, "no one got on the car at Beaver Falls but a little boy about that high." He says, "I am that boy."

Now, I am very glad that Mr. Terry, my good friend, has found something "good" in the subject of two months ago, and I think that the whole plea of his paper—and I know that he wants me to speak plainly—is for a closer relationship between the shipper and the carrier. The trouble to-day is because of the lack of that closeness. If the railroad representatives and the shippers would come into a relationship that would afford a perfectly clear understanding between them I think that many of the errors of to-day might be avoided.

Again, I am no stranger to the fact that there are people in the world who use the railroads who take every opportunity to "do" the railroads, and think it no sin or crime. But I hardly think that can be applied to the general shippers of the country.

I made a few notes hurriedly as my brother spoke in order that we might follow the thought, because it is only fair that we should try to stick to the paper. And the first point I noticed was the one in reference to the automatic couplers and air brakes. The increase of claims since the introduction of these two facilities has been alarming, and I am of the opinion that the situation to-day on every railroad is alarming. If there are any gentlemen in the room to-night who have to do with the operating end of the railway line, and who have followed the dispatcher's sheet over a division of a hundred or more miles, especially with a view to rectifying some delays on the road, you have been surprised to find the number of stops and the excuses given for the same. If you are in the transportation department you know better than I can tell you the effect of any defect in the air brake equipment both to life and to property. If you come a little closer to home you have discovered in the yard switching work a large amount of noise that was not apparent before the automatic coupler came into existence. And Mr. Terry wisely said or intimated that there is less care in that respect now than then. If you are an operating man, you know that to-day there are more "short tracks" in the yards of the United States than ever appeared under the old system of coupling cars. For the benefit of the gentlemen who do not understand short tracks I might say that is where you find a car over the end of the track. There are more "short tracks" to-day than ever before. And there are more arguments in favor (?) of this rough handling than the best superintendent I ever knew could meet and decide upon.

I am acquainted with a yard of no mean proportions, where a very sensible fellow placed a white post thirty feet from the end of every track, and upon an inspection of that yard with him, in not one single instance was the car ever at the thirty-foot limit from the end of the rail. And so the first cause, perhaps, of claims to-day, and the present cause for alarm is largely the automatic coupler and the air brake.

The next point made was the point in regard to the care of the shipper in packing. And right here I might say that while a man's position, either inside or outside of the railroad, will change the trend of his logic, remember that "in or out" cannot or should not change the general principle of the thing in our discussion to-night, and the general principle of things in that sense is similar to the common law under which railroads operate.

If I were to ask this audience this question, Do you know a man in business that will knowingly pack his goods in any other way than a condition fit to carry them? I think I anticipate you when I say there is not a man who will argue from that premise. Secondly, the packing of goods by the shipper, that is, the box, crate, barrel or case, is always subject to the inspection of the receiving agent, and the receiving agent, before he gives signature, has the full authority not only to examine the package, but he has the supreme right to (See Classification Rules, 2 c. d. and 4 a.), open the package if he will. Therefore, if the railroad, through the carelessness of a cheap man, receives a box improperly packed or in any other than good, apparent good, order, the responsibility for "packing," if you please, rests with the man who puts his name down and says he received in apparent good order from John Smith a box of soap.

The next point is about the railroads and their difficulties under shippers' carelessness in packing and the automatic coupler and the air brake. Name me a city in the United States where the railroad authorities and the shippers have conferred together on any change necessary because of up-to-date facilities? Gentlemen, does it not all revert back to the fact, which has been stated or intimated in the suggestion, that it is time that the railroads and the shippers had a more close relationship? If the shipper does not pack his goods in a condition that will take them over the road under ordinary transportation, I believe that every good common-sense merchant in the country will increase the thickness of his timber from $\frac{1}{4}$ to $\frac{1}{2}$ inch in order to meet that condition, provided a conference is held and he is shown that it is to his greater advantage.

The next point made was with regard to acid in carboys. Those of you who were here will remember that that very subject was touched upon two months ago. It is a dangerous subject. I personally have had experience with half a dozen somewhat disastrous fires due to the breaking of carboys. But will any railroad man argue that these fires occurred from the fact that the glass in the carboys was not of sufficient thickness to carry the contents? In every case it was due, as I remember it, to peculiar yard handling, or the breaking in two of a train in motion because of a defect in air brakes. Going back to the principle of the shippers' packing, you might go back to the maker of the carboy, and you can get affidavits until you are so sick of them that you will not listen to them, to the point that these carboys are of sufficient thickness to carry the contents properly under any ordinary car movement. Therefore, when a railroad takes the position that they will not pay claims on carboys because of the peculiar construction of the carboy it is up to the railroad people to prove the faulty construction, make or manufacture of the carboy itself. And you are up against a hard proposition.

As to loading, after the receipt is signed the shipper has absolutely nothing to do with the loading of the goods. The freight claim agent has absolutely nothing to do with the loading of the freight, and most of the claim agents that I have had to deal with have been more theoretical than practical in solving the problem of loading. The loading of freight is subject to a foreman and a gang of men, and they can create more trouble in five minutes than all the claim agents in the country can rectify in ten years. You gentlemen of the railroads make rules at your loading stations, you have the checker or the foreman of the gang or a man specially designated to look into every car before the seal is put on it to see that the loading is correct. But you know that investigations have proved to you a thousand times over that the whole trouble, notwithstanding the foreman and his men, is in the loading of that freight. It is wonderful what they do. There are many causes for it, but it has no part in this discussion. For instance, the method of payment. You pay by the hour, you pay by the ton, you hire a man half a day, you pay him part time, he is trusted by his checker, the foreman is negligent, the man who seals cars has ten minutes in which to do thirty minutes' work. All these things enter in, and while, as Mr. Terry says, you cannot put your finger on the man, answer me, if you please, in your conscience at least, is the shipper or the railroad responsible for that condition?

The next point is concealed loss, the most annoying the railroads have to deal with. If a man ships a box of wine and gets a receipt for a box of wine, he has a perfect right to expect a box of wine to be delivered, even though there is water in the bottles, and it is up to the railroads to prove where the exchange was made and the article was made to "blush." And in any unbiased court the railroad will lose when suit is brought on that proposition. If you sign for wine, gentlemen, be dead sure you get wine. That's all. My friend, Mr. Terry, suggested that this change might have occurred at Coraopolis. I am not acquainted with Coraopolis, therefore I wouldn't intimate anything against Coraopolis.

Now, in regard to loading by shipper, another very disturbing element in the adjustment of claims. If a railroad makes a rule permitting a shipper to load a car and gives him a receipt for the contents of the car, based on the honesty of the man who loaded it, it is a similar case to the box of wine. If you sign for a carload of lumber and the man can make affidavit to the loading of, say, a thousand feet, I feel quite confident that you will pay for that 1,000 feet if it is not delivered. It is a case of the railroad having opportunity to know what they are signing for and their responsibility rests with the signature. Just let me illustrate by the responsibility of the people who took the green goods of Cassie Chadwick. Cassie got a receipt for "money," and it was up to the man that gave the receipt to know whether money was there, and failure to know did not relieve him of responsibility. Ignorance of the law excuses no man, is a common saying. Ignorance of the goods received excuses no railroad, when they have the opportunity to know.

With regard to the commission, I repeat that I think it would be a good thing for this city. These gentlemen, whoever they are, might consider the grievous things that come up between shipper and carrier and by their trained mind reach a conclusion that would be reasonable, and a shipper that will not accept a reasonable solution of a thing is just as guilty as a railroad which attempts to be unreasonable in the adjustment of a claim. I am a firm believer in the commission, and I hope that one day Pittsburgh will have such a body in its midst.

Now, the question between the carrier and the shipper is a serious one, and I am not going to joke any more about it. The question is, how shall we arrive at a proper solution of it. Each side contends for a certain thing; the shipper has a receipt signed and the railroad has the damaged goods. I think that reason should govern. If a carrier receives an iron sink and the agent over at Coraopolis signs for it as "in good condition," I think it is up to the railroad to pay the claim if that iron sink, when it arrives at destination, is in two pieces instead of one. The evidence is there of damage. It was not there when the receipt was given. The burden of proof is not on the shipper, for he has the document to prove his case. The burden is on the railroad, because they have the result of the handling. That is a thing that I should think might be adjusted promptly.

Second, the greatest complaint of the shippers of Pittsburgh, as I find it, is the tremendous delay attending the adjustment of claims. A man takes a shipment to the P. & L. E. It is not that road, but we will suppose it is, for example. He places it on the platform and a man with a truck comes up and takes it and starts for a car. He slips and falls. The truck falls, the thing falls and is broken and the foreman of the platform says, "Jim, duplicate the order; we will pay for it." Gentlemen, in all fairness, tell me why it should take four months to pay that $1.50? Is it any wonder that the shipper gets out of patience?

Again, the damage does not occur on the platform, but somewhere unknown to the shipper, and shown at destination; and he puts in his claim. It is given to the local agent, who has some clerks on claim work, overworked as a rule. It is put through the ordinary operations of a claim and in six months the paper comes back to the local agent and he writes a nice note to the shipper, stating that the freight claim agent says "that on account of poor packing this railroad is not responsible for the damage." The man who shipped contends for his point and says: "You investigate again. I want this thing settled or I will sue," and he does not hear from it for three years. I thought that would evince a laugh. There (showing a bundle of papers) are ten of them right there.

By what process of reasoning do you, as railroad men, expect that a man, whose money is invested and whose trade is at stake, will receive such a flimsy answer as that? That is what is the matter between the shipper and the carrier. Someone has said that the claim department is very much overworked. I am no stranger to that fact. But every man in business is supposed to keep pace with his business, whether it be selling goods or paying damages.

Now, I have a little squib here from a newspaper which I picked up this morning about the L. & N. road that will help.

EXPEDITING CLAIM SETTLEMENTS ON THE L. & N.

The Louisville & Nashville Railroad recently has made some modifications in the freight claim department, looking to the expediting of claim settlements. Two traveling claim agents have been allotted to cover the entire line, each to visit every competitive point in his division at least once a month to take up and settle loss and damage claims, $10 to $50 inclusive, after verification and consultation with local agents and traffic officials at points where the latter are available.

All representatives of the traffic department have been instructed to report promptly to the freight claim agent all claims for $50 and over, covering loss and damage, whether originating at local or competitive points, which in their judgment need preferred attention, and it will be the duty of the traveling claim agents to make an early trip to investigate the matter and recommend adjustment.

Under this policy, according to J. A. Brooks, traveling freight agent for that road at Dallas, Tex., the Louisville & Nashville is now making prompt settlement of overcharge claims at principal stations all over the system without referring them to connecting lines for authority before settlement with claimants, and it is believed the practice will save much time in effecting settlements.

The roads in large cities, where competition is keen, are adopting that same principle to-day, and these roads are having less claims presented where the fellowship and mutual feeling is good, than roads that pocket the claim and keep the fellow "'hollerin'" for three years.

I am acquainted with a man who went to a railroad as claim agent and on assuming the office he dug out and settled without investigation 4,000 claims, averaging less than $3.00 apiece, and some of them 5, 10, 20 years old. That is what is the matter with the public. There are railroad men in this room to-night who, if you had a claim for $3, and came before them with a straightforward story, would say: "This is true—this was broken and I will settle it," and the merchant would be a walking advertisement for the welfare of your road in this community and in every community where he touches. The relationship between the railroads and the shippers on the claim question is tremendously strained, and the strain can only be relieved by the railroads.

I thank you.

President—There has been some aspersions cast upon the coal shipper, who charges hard coal prices for soft coal of run-of-mine grade. We have with us to-night a gentleman who a few years ago was connected with one of the largest trunk lines in the country, and he probably can talk knowingly from both sides, Mr. Samuel P. Woodside, of the Pittsburgh Coal Company.

Mr. S. P. Woodside—Mr. Chairman and Gentlemen: There was a man named John—not the Baptist, nor the Beloved Disciple, but a plain country lad. In due course of time John fell in love with a girl, married her and started to housekeeping. About a week after he started to housekeeping he appeared one morning at his father's house with his trunk. "Why, John, what does this mean?" "Well, it means that I am coming home to live." "What is the matter?" "Well, I will be dodgasted if I am going to let any woman that ever wore shoe leather boss me. I didn't get married to be bossed." "You didn't get married to be bossed? Take your trunk and go back to your wife." "No, I won't do that; I won't go back."

The consequence was a long discussion, and finally the old man said to his son: "Don't you know that every married man is bossed by his wife. If you don't you had better learn it, because you will have to come to it sooner or later. And, now, in order to prove it, take the big farm wagon, put in the double team and load it up with pumpkins. Start out through the countryside where you are known, and as you come to the different houses ask who is the boss in the house, the man or the woman. Where you find the wife is the boss, leave a pumpkin; but if you find that the man is the boss, tell him to take his pick of the team."

John started. He went a long way and the pumpkins were going out of the wagon in good shape. Finally he came to a house, rapped at the door and a man appeared. He said to the man: "I am in a little difficulty and I would like you to answer me one question. Who is the boss in your house, yourself or your wife?" "Why, I am the boss, of course." "All right. You just come out and take your pick of this team." "What does this mean?" The young fellow told his story, and the man went out and looked at the team and said: "I will take the sorrel." "All right, go ahead and unhitch." About the time he started to loose the traces a woman's head appeared at the window and a shrill voice said: "No you won't take the sorrel. I like the roan best."

Gentlemen, they have been leaving pumpkins at my house for nearly twenty years. My wife tells me that I do not know much about anything, and I am beginning to think so myself—particularly in the matter of claims.

Taking into consideration the fact that our good friends Mr. Terry and Mr. Wardrop have had several months to wander through the Garden of Eden, eat of the tree of the knowledge of good and evil, leave nothing for anybody else, have found time for digestion so as to be prepared to come here and tell you everything there is to tell in regard to claims, I don't see how you can expect me to come here and give you a talk on short notice.

I used to think I knew something about claims. That was when I was proud to be the general agent of the Erie railroad and handled a good many. I thought there was only one side to the claim proposition and that was the railroad's side—although I will say that I tried to be as fair as a man could be in handling these claims. But, as I have stated before I have come to the conclusion, based on the number of claims now presented to the railroads and the percentage that are declined that I don't know the first elementary thing about claims.

I have a belief, however. I believe that claims should be clean. That is, not only should the $45 or $50 clerk who has got to exercise judgment on a matter that might well be submitted in many instances to a member of the bench, not only should that man be required to take the claim from its jacket and dust it off at least once a month, but the shipper in making that claim should be clean as well. He has no business to present to a railroad a claim that is not just and fair in every sense of the word. He has no right, as Mr. Terry said, to expect a settlement on the basis of $4 a ton for coal when the contract was for $1.75; nor has he the right to do the same thing with coke, or any other merchandise.

I believe, gentlemen, that the ground has been fully gone over in the argument between Mr. Terry and Mr. Wardrop, at least so far as I could cover it. I believe there has been some improvement made in the grade of men that are employed to adjust these claims. I know of some companies, some of them entering this city, where they expect to keep up their work by the employment of men at $40 and $45 a month. I know that because I have been asked to recommend men for the position who were willing to work for that amount of money. And I declined, because I could not honestly recommend a man at that figure to handle a business as arduous as the settlement of a claim.

There are a number of other points, gentlemen, that might be touched upon, but I do not feel competent on such short notice to go any farther than I have gone. I can only say to you, this, in conclusion. The other day in the little borough in which I live, we had an election. I was interested in two candidates. I fought hard, but I got licked. But I was only 50 per cent licked, that is, I got one man in and the other was defeated. At the same time I am convinced now that if they had put up two opponents to my candidates I would have been 100 per cent licked. At the same time I did all I could for my candidates. In the campaign we ran across a man who has quite a following in the way of votes. He was not only constable, but high constable and road master as well. I suggested to one of the men who was working with me that we had better see Mr. ——— and ask him to swing in line for our candidates, particularly in view of the fact that they were the regular nominees. We did. He said in reply to the appeal: "Well, Mr. Thompson, I can't say much. I am a public official of the Borough. I am elected by the citizens. But I tell you what I do. I say, Billy Washbaugh, you vote for the regular nominees. If you don't, you don't get no more work from the Borough." Like Mr. ———, I hadn't much to say, and I have said it.

President—We would be very glad to hear Mr. John H. Jones.

Mr. John H. Jones—Mr. Chairman and Gentlemen:

I have often thought that I would like to make a speech. About ten years ago I had the pleasure of trying to address a high school class. When I got up in front of all those intelligent youngsters and their parents, the number magnified I don't know how many times and I lost my speech. The next day a young fellow stepped up to a relative of mine and said: "Your brother-in-law's was the best speech that was made." The little relative swelled up, and said, "How is that?" He said, "It was the shortest." So I have always tried to hold that reputation.

I have been very much interested to-night in the remarks made by Mr. Terry and also by Mr. Wardrop and the other speakers, and I think there is much to be said on both sides.

Speaking of coal. As we have made no claims on Mr. Terry at an exorbitant price for coal confiscated, a few words in that line may not be out of order. When the railroads find it necessary to confiscate coal that is shipped to a mill or for domestic use, if they take a car of coal to-day I think they ought to replace that coal to-morrow or the next day and deliver it to the consignee. Instead of that, we know cases where coal has been confiscated by the railroad which was shipped to a consumer who uses perhaps one or two cars per week. This consumer depended on this coal arriving to keep his plant in operation. Probably a week or ten days after the coal was shipped we get notice from the railroad company that they confiscated the car. We also get word from this small mill or retail yard that they are out of coal.

The railroad companies expect us to make shipment of another car of coal to take the place of the car they have confiscated and which should have arrived ten days ago, and this second car may also be confiscated. This small user of coal, who buys it by the carload, has to go out into the city and buy coal at retail prices, perhaps double what he was purchasing that coal for. Under such circumstances I think it perfectly proper for the purchaser or shipper of that coal to ask the railroad company to pay them any extra expense to which they may have been put.

Our dealings with the railroad officials have always been very pleasant and agreeable. We have never taken the position I have just explained, nor would I have raised the point had it not been brought up by Mr. Terry. I think the suggestion made by both Mr. Wardrop and Mr. Terry, that the shipper and the carrier get closer together, is a very good one, and if, for instance in the coal business, the railroad people find that in order for them to keep their locomotives going it is necessary to confiscate coal, I think that after 24 or 48 hours, when they have accumulated enough coal at that point to keep them going, they should immediately reconsign a car of their coal to the customer whose coal they confiscated, so that such customer shall not suffer.

Now gentlemen I propose to hold my reputation for brevity. I thank you for your attention.

President—Col. Albert J. Logan, will you kindly favor us with a few remarks?

Col. Albert J. Logan—Mr. Chairman and Gentlemen:

When I received the invitation to be present to-night I was very much pleased, and concluded that it would be both a pleasure and a benefit for me to be here to hear the discussion and especially the paper to be read by Mr. Terry. There was a part of the invitation that was extended that I did not expect to accept—that is the privilege that was extended to take part in the discussion. I do not feel that I am sufficiently up on this matter, after the splendid paper of Mr. Terry and the able discussion of Mr. Wardrop and the other gentlemen, to say anything which would be of particular interest to this club. I will say, however, that I am interested in the subject of the shipper and the carrier getting closer together. I think that, after all, what we both want is a square deal, and I see no better way of getting that than by having a thorough and fair understanding. On the part of the shipper, he should be reasonable in the preparing and packing of his goods that he offers to the carrier. The carrier, of course, as has been said, has the right to demand it, but shippers should deliver goods in a way that there would be a reasonable probability of reaching destination in safety. But I must say that it has to some extent come to my knowledge where there seemed to be a great disposition on the part of the railroads to at least hesitate in the settlement of claims.

Now, in a business house when a customer makes a claim for a shortage in weight or an inferior quality of goods, I do not think it is very often that the merchant or manufacturer will allow it to run over a very few days until it is settled. It rarely ever goes over into a month or years, as the railroad companies many times let their claims run. I do not think it is a just excuse for delay for one of our local roads to refuse to pay a claim that is clearly a damage to the consignee because some other road has something to do with it. Now our friend, Mr. Terry, referred to the showcase matter, saying that they had not yet been paid for a damage they had been compelled to settle. I do not see that has anything to do with the man that was really the owner of the showcase, the consignee. He knew Mr. Terry's road as the carrier who delivered to him the goods, and had a right to look to them and receive his compensation, if any, from them, and I believe that such claims should be settled promptly in all cases.

The question of leaky cars has been referred to. I can see no reason why a railroad should not be responsible for a leaky car. They agree to carry merchandise in good order. Perishable goods should be protected from the sun and the rain, and they should know whether their cars leak or not, whether the doors are closed properly or not. Their representatives on delivering the goods should be able to note such. There are not many kinds of freight packages that, where a car has leaked, there will not be some notice of it on the outside of the package. In such cases prompt settlement should be made of the damage sustained.

I had not intended, Mr. Chairman, when you surprised me by calling on me, to say even what I have.

I thank you gentlemen of the Railway Club of Pittsburgh for the privilege of being here on this very interesting occasion, and heartily join in the suggestion for a better understanding and a closer friendly relation between carrier and shipper.

President—I had the pleasure of meeting a gentleman here to-night whom I understood to say that he had no kicks coming—and he is a shipper, too, Mr. D. C. Shaw.

Mr. D. C. Shaw—Mr. President: I would be a very ungrateful guest if I would be invited to a function like this and come with a kick.

When I first received this invitation I was very glad to know that I would have the opportunity of meeting the Railway Club of Pittsburgh. When I got in here and received an intimation from your president that I would be called on, being a shipper without a kick, I felt a good deal like the East End physician whom a great many of you know and for whom all who know him have a very high respect, who bought a piece of property and built a very nice house on it. In a short time the Christian Science Church came along and bought the next lot to it and built a church on it. A friend of his met the doctor and said to him: "Doctor, you are right next it." I felt the same way when I got this invitation. I was right next it. But another friend met the doctor and said: "Doctor, you are right up against it." And that is the way I felt when I was called on here. In fact your president is a little bit in the position of a young man who went to make the first call on a girl. He was a very bad stutterer, and after trying to entertain her in the best possible way he could, the conversation lagged and time began to hang very heavy. After a while he says: "How is your mother?" She was very much surprised, knowing he did not know her mother. She answered: "She is very well, but why do you ask?" "Oh not that I care a damn for the old lady, but it makes talk."

I am just a little bit afraid that is why I have been called on, because I really do not believe that you honestly expected to run across a fellow who had no kick.

Now I must confess to one thing, that in all the claims that I have made on the railroad companies, where they were properly made in the required shape, while sometimes they would be a long time being settled, I was always received with the greatest of courtesy. Maybe I did not get my money, but I was well treated.

Now I don't think I ought to be called on to discuss this question of freight claims. I think it has been covered from start to finish in a very able manner, and I think the shipper, so far as the game has been played, has the best of the argument. I do not believe that the average claim that is made—especially in smaller shipments—is often correctly made. But if you knew the difficulty under which we labor in sifting out these claims and getting them in proper shape, and knowing that the claim that our customer makes upon us must be settled—for we can hold no argument with the customer (we must settle promptly)—we cannot afford to lose a $150 customer for a $1.50 claim. We use the very best means we have to get these claims verified and in proper shape to present to your companies.

I will confess that every now and then we run "up against it." We find that a customer has made an unjust claim. An instance the other day that occurred between here and Homestead (the shipment being made on the Lake Erie road) almost forced me to promise myself that I would never make another claim. Maybe that is one reason why I come here without a kick. We made a shipment of a mixed lot of groceries to a very good customer. Among other things were three boxes of groceries, meaning assorted groceries. The customer made a claim for missing articles for $6.10. I investigated our packing department and found a man who said positively that he had put those articles in a box and marked it groceries. I sent over to the Lake Erie railroad and my man was received with the greatest courtesy. The shipment was checked over and everything accounted for. I wrote to the gentleman to go to the Lake Erie agent at Homestead and see that the shipment when receipted for checked up properly. The report came back that it did and those articles were missing. I was not satisfied. I was trying to see whether I or my force was at fault. I took a man, the best man I had on the floor, and told him to go to the Lake Erie road. I said: "I want you to be careful and I want you to be sure, but I don't want you to get into any friction in the matter. Check this shipment over with the agent who received it." He did that. My instructions were if he found the shipment all right to go to Homestead and check the shipment over with the consignee, "and before you go to the Lake Erie go to the store and see every box of that shipment. Understand me, I want you to see every box in that shipment, whether it is full or empty. When you get there look it over with the gentleman. If you do not find it there, take the gentleman and go to the Lake Erie railroad and look it over with the agent." He did, and he struck a place where the man who didn't want to live with his wife could have left a pumpkin. The man and woman were both in the store. They said: "That box did not come. We have looked over every box we have here, every box open." And the woman says: "Every box but one. There is one there you did not open." Well the man says: "There is nothing in there but"—naming the article. My man said: "I must see it." "There is no use in examining that box." "Well, I can't report to Mr. Shaw unless I see that box, or he will send me back here to Homestead before he will receive me." They opened the box and on top, the very top layer, was the $6.10

worth of stuff that was missing. I made up my mind that I didn't believe I would ever make another claim.

Now there is no doubt that there are a great many just and a great many unjust claims, but I am satisfied after hearing this discussion to-night that what the business people want is for the shippers and claims departments of the different roads to get together, to get closer in touch with each other, and just such meetings as this will engender a feeling that in the future should make it a great deal easier, and it should save lots of money to the roalroads and lots of trouble to the shippers.

I am glad to meet you, gentlemen, and I thank you for this opportunity to speak to you.

President—Mr. Terry is entitled to some assistance in this matter, and we have some freight agents here and we would like to hear from Mr. Oliver, of the Pennsylvania Company.

Mr. W .H. Oliver—Mr. Chairman and Gentlemen: As a local freight agent I have been very much interested in this discussion, but I don't believe that I am competent to add anything to what has been said, on such short notice, at least. I am personally of the opinion, and have been for a number of years, that a local agent at a station should have authority from his freight claim agent to settle certain claims of a specified maximum amount. And I believe that a local agent, if he is such an agent as he should be, would be loyal enough to his company to see that the company is not defrauded. I myself would not want to settle any large claim. My own idea of it would be $10 or $15. I believe that an agent should be permitted to settle claims to that amount, possibly larger, but not very much.

There was one gentleman here who put it up to the agent that he had authority to open a package before he signed for it and see what was in it. I can picture to myself the chaos that would result at my station if we would begin an operation of that kind. It would be positively impossible for an agent to do it, and if it were not impossible it would be cheaper for his company to pay the claims that might arise on those shipments than to furnish the help to open the package to see whether the stuff was there or not.

President—We would like to hear from Mr. Hurd, commercial agent of the Lake Shore.

Mr. D. F. Hurd—Mr. President, this is unexpected and a surprise as well as an embarrassing position, as I have been enjoying myself up to the present moment. Mr. Terry has presented the case very ably from a railroad standpoint, and Mr. Wardrop has very aptly responded from his point of view. Mr. Oliver touched on one matter I would refer to—the inspection at freight houses of all packages—this would block up the freight stations so there would be so many men opening packages and examining contents that it would look like a bargain day counter with trading stamp attachment.

There is another point that occurs to me—in fact, several—but as Mr. Terry will have an opportunity to elaborate upon them, I will not mention them as I know he will take the opportunity to present them—and that is a feature of which Mr. Wardrop did not speak.

We all know that the railroads bring the freight into the city—to the freight houses, but do not deliver to the consignee's place of business. I looked out of my window the other day when there had been a great crash and saw a big wagonload of goods was down in the street, several boxes being broken and contents scattered. I don't know which one of the roads received the claim for the damage. Possibly the papers would indicate it happened anywhere but on Smithfield street and an affidavit made to fix the location. This sounds ridiculous, but I have seen claims with just such unreliable documents, but of course they are the exception.

There is a serious side to the claim question, and I think Mr. Terry's paper was intended to deal with that side; that the paper was to present the railroad side in fairness and equity which I think is all the claimant desires.

One of the gentlemen spoke of co-operation and illustrated how he did his part in making an investigation of a shortage of a peculiar nature. He certainly had the right idea, and his efforts to locate the goods before making claim certainly shows the spirit of co-operation. Much can be had with co-operation, but not the co-operation of once a month, sitting here and saying, "Let's have co-operation" and then going out without getting any nearer it. We have got to agree on something—get together—and then you will reduce your claims and the railroads their claim departments.

There are as I said, one or two matters on which I know Mr. Terry will touch, and if I were not so sure of it I would say something further myself because I think they are important. Gentlemen, I thank you.

President—I know there are quite a number of other representatives of the shippers here. We would be glad to hear from any of you.

Mr. E. A. Kitzmiller—Mr. Chairman and Gentlemen: This is a very interesting subject to me, having had charge of traffic for our house for more than 20 years, with its attendant difficulties and perplexities, which were many, increased often no doubt by misunderstandings. These difficulties, however, decreased as we became better acquainted with those who had charge of the claims, and I am free to say that recently, in fact for the past three or four years, we have had very little if any trouble, our relations with railroad companies being much more harmonious. I think one of the reasons for a decrease of the difficulties is that we have been more careful to investigate these claims before filing, and being morally sure that we are correct before presenting them. It is our custom now never to present a claim until we have all the information necessary to substantiate every item, by an affidavit from at least two of our employes. We never receive a shipment in a damaged condition that is not carefully inspected by more than one experienced employe, and if the damage is serious we ask the delivering company to send a representative to pass upon it. We do the same when an overcharge for weight is found and reweigh every pound in the car. In fact during the past four years we have weighed the contents of every car received, case goods as well as sacks. This of course is an extra expense and trouble, but we find in the end a substantial advantage, as it has decreased our claims and consequently our troubles. And, I am pleased to say, we have found the carrying companies have met us in a kindly spirit and have given much better attention to the claims we have filed.

I remember very well when some years ago we had on our books as high as $3,000,00 in claims. Some of these fully three years old. I am sure no one will say it was either just, right or reasonable that the merchant should lose the use of that money because the shipment was handled by three or four lines, and in many instances because of clerical errors in offices of railroad companies. No matter if the delivering line could show that the error did not occur in their office, they were parties to the transaction; they had their proportion of the profit, and I think should pay the claims, and if afterwards it could be shown that the amount paid was not correct, collect same from the party to whom the claim was paid. This at first thought might appear difficult, but I am sure there are very few business men who would not willingly enter into such an agreement. In fact this is substantially the condition under which we are now working, and it has proved very satisfactory in every way. I may say further that in very few instances have we been asked to pay any part of claim presented.

I remember some years ago it was reported that one system carried on their books claims amounting to $3,000,000, and that this amount was being used by officers of this system for their own profit. It is difficult for a layman to understand how this could be done, but whether true or not the statement one can understand would be accepted by the average business man who believed he was being unjustly treated by being deprived of the use of his money.

I am convinced, gentlemen, that just such meetings as this, where railroad and business men are brought together to discuss this and other interesting subjects to both, will accomplish more to do away with prejudice and unfriendly feeling than anything I can conceive. Harmonious action in the interchange of ideas, explanations of the difficulties attending peculiar as well as common cases will, I am sure, result in reducing to a minimum the cause of difficulties attending the matter of claims, which too often has created enmity between business and railroad men.

I am glad to see harmony among railroad men. Even in the midst of this 20th century rush for business it speaks well for you, and I believe I can say for a large majority of business men that you will be met by the same disposition, and suerly there is no one thing that will produce the desired result quicker than an honest interchange of views between men who desire to overcome just such difficulties as have been discussed this evening. Confidence is what we want and must have to live peaceably, whether it be in business or social life.

I thank you, gentlemen, for the invitation to this meeting. I have been benefited. Continue your meetings with business men; they will result in good to all.

President—Now Mr. Terry will close the discussion.

Mr. W. A. Terry—Just a word or two, as it is getting late.

Mr. Wardrop, who is almost always right—almost always—seems to have got a little mixed on the first point. I was referring to carload lot shipments loaded in the plants of the shipper. I thought I so stated; I still think so. It may be that it is up to the railroad company, Mr. Chairman and gentlemen, to examine every shipment that is offered before giving a receipt for it, but I don't know anyone who would be quicker to object to the consequences of that than you shippers and your consignees who would be forever getting their freight.

Now another point is made. "Is it reasonable to expect that any business man in the Pittsburgh district or anywhere else would provide a package which would not carry that shipment to its destination?" I want to refer to that a moment. Transportation is a hazard. The mere matter of picking a package up here and rolling it carefully over there is not all there is to a movement. There are risks and the packages must provide for those risks. It must not be good enough just to land it over the line of safety; it must be good enough to withstand the jars and jolts that are necessary to modern transportation.

Yes, I am sorry to say, there are those who will willingly provide a package that is not fit for the transportation of commodities. I am in danger of making illustrations personal because of the fact that some of our commodities are so largely in the control of one concern—I wish the gentleman who represents that concern was here—that of tin plate. We received in our Pittsburgh station a car of tin plate—and this illustration represents a hundred like it. The package, which should be as you all know, a sound and solid one to carry such a commodity, was absolutely broken into a hundred pieces, and the ends or the thick pieces of the box were rotten. I have samples in my office and would be glad to exhibit them at any time. The top parts were not as thick as the ordinary pasteboard that makes the back of your ordinary letter pad. How it held together to hold a nail, even, I don't know. But that is the kind of packages those shipments were enclosed in.

A shipper receipts for a package as apparently in good order if it is delivered to him at his place of business. The railroads, just like the rest of you, have places for doing business—their freight stations. At those stations we can indulge in more detail than we can where they are loaded in your stations. We could not by any possibility keep the army of men necessary to check and examine carload freight loaded at your plants. We have got to depend upon you. If we are willing to take it from you at your plant and save you the haul to our station, is there any reason why you should take unfair advantage and give us either improper packing or loading? Is it really up to the carrier? I think not, gentlemen; it is as much your duty as ours. I am only asking for co-operation. I say we will probably have some of these claims to pay. We do pay them. But is it right for you as shippers to put them upon us, when by care on your part they can be avoided? That is the point. I say we should have co-operation sufficient to ensure the proper package that will carry the shipment through to its destination, even though it does receive something more than an ordinary jar.

The character of the receipt: It is up to the railroad, is it, if it receives a shipment to deliver it? Will you kindly tell me what is the difference between the receipt of John Smith and the receipt of Paul Jones? John Smith represents the railroad. He receipts for a package in apparently good order. Paul Jones, the consignee, receipts for it from carrier. You hold our receipt for a package of freight apparently in good order—apparently what you say it is; we don't know it, and we haven't the time and you would not permit us the time to examine it, but we accept the package as containing what you say it contains and as a carrier at destination receive a receipt exactly like it from the consignees. But when the consignee opens his package after he has receipted for it and taken it to his house and finds a damage that may have occurred in the packing or with the drayman who took it to the station at point of shipment, or with any one of the several carriers en route, or the drayman who hauled it from the delivering station to the place of business of the consignee. Is that receipt of no value? Is it not just as important that the consignee should examine his package before he signs for it as after he has signed for it? Is it not, in the words of the gentleman, "up to him?" A receipt is a receipt, no matter whom it is from.

One word with regard to coal: I am sorry Mr. Jones has not plants on our road, because his coal is good and the kind we would like to confiscate if we could. But I want to say that I did not refer to confiscation. I referred to coal lost in wrecks or through many accidents that go with railroad transportation. Wrong delivery: I do not care to dwell on that point to any extent. We had a few instances of the kind where we were presented with claims that were absolutely unjust, and I want to say that Mr. Jones was not the man who presented them. And all unjust claims, no matter who presents them, are bound to establish in the mind of the carrier the idea, "There is a man I have got to look out for." That is the wrong kind of education; that is the wrong kind of feeling to establish in the mind of either party. I have no doubt that that feeling has been established in the minds of shippers by apparently unfair and indifferent treatment which railroads may have given him, and let me confess to you that I know that these cases do exist. I know that in many instances shippers have "a kick coming." I realize that fully and I am willing to make every effort to remove the cause of that kick.

There is a point that ought to be mentioned. I think it was raised by Mr. Kitzmiller. Settlements are made with a consignee upon that consignee's representations of a condition. It is a matter of policy—not always of equity—I will say that equity is the basis of all transactions of this particular sort, but you handle it on the basis of policy largely. Is it fair that the carrier should not be given an opportunity of putting himself in the proper shape with regard to these cases? The delivering carrier has delivered a shipment and received a receipt for it. If the man was not satisfied with the character of his freight why did he receive it and receipt for it? After he has done so how can the forwarding carrier honor the claim of the shipper without an investigation? We are absolutely without information as to the basis of your claim. We have no way of knowing. I am of the opinion, and I think every local agent will verify this, that when damage has been discovered a representative will immediately go to consignee's place of business and assist in the adjustment of that case and righting the wrong so far as he can; at least putting it intelligently before those who have authority to adjust it, that is, if they are given opportunity.

Gentlemen, it all gets back to the one point, we can all be just or unjust, reasonable or unreasonable. Nearly everyone who has had anything to say to-night or that I have talked to in reference to this, says: "Get closer together; co-operate." That is after all the point. I don't want you to misunderstand or misinterpret the position I have taken with regard to these claims. I think our position is right, absolutely. We do not always get the right kind of co-operation, but perhaps the only reason we have not had it, from all that has been said, is because we have not reached out after it.

Mr. F. H. Stark—I don't think the large small man from Beaver needs any defense from a small large man like myself. However, I believe that the paper is conspicuous for its fairness; that the writer has manifested a desire to be equitable. I represent both sides in a measure. I want to be considered a railroad man so that I can enjoy some of the privileges of a railroad man.

There are one or two points that I would like to mention and call your attention to, and that is where Mr. Terry says that the damages have increased since the introduction of the M. C. B. coupler and automatic air brakes. I hardly think this is fair. We men of the mechanical department contend that since we have done away with the slack between cars there is less liability for damage to freight, and I believe that is true. Since the introduction of the M. C. B. coupler in yard service the handling of cars is somewhat more severe. We are endeavoring to build cars that are 100% strong in every part and to carry the increased load. With a desire to expedite the movement of cars the tendency in yard switching is to handle cars somewhat roughly. But the effect upon freight in transit is not nearly as bad as it was with the link and pin coupler, with 40 feet of slack in a train as we used to have. We made an actual test at the Westinghouse plant the other day with 40 cars equipped with M. C. B. couplers and there was only about four feet of slack in the whole train. We made some very hard tests and many of us remarked that we found it much more uncomfortable sometimes in a passenger train. There was an absence of that jostling and hard thuds that we expected.

So that is true in the case of air brakes. We all realize that when we want to stop and stop quick, without air brakes and automatic couplers, with the slack of the cars it is a known fact that freight would be knocked over and the ends of the cars knocked out, and that is not true to-day to the same extent. So that I would like to have Mr. Terry modify his views on that a little bit and not go out before the public with the statement that the roalroads are going backward.

I know that it is getting late and I don't suppose you want any further discussion, but I call to mind a case of a car of sewer pipe. The crating was apparently as good as it was when the car left the works, and yet there were a number of sewer pipe with heat cracks that would not stand handling. Would you expect the railroads to be responsible for the condition of such freight?

We had another case where we had a glass cylinder among a number of others to go to the St. Louis Exposition. When the glass case arrived there was one of the cylinders broken. They claimed it was not handled roughly of course. But there was one honest fellow at the originating point and he said the box fell off the truck when they were removing it out of the factory, and yet they wanted to hold the railroad people responsible for it.

I know another case where there was a shortage of lumber, and it developed that in the mill yard where they loaded the lumber they delivered a wagonload of the lumber to the wrong car; hence a shortage.

So I believe there should be a spirit of fairness, as expressed by the writer of the paper. We had a case the other day where the Pittsburgh Coal Company wanted to put in a claim for some coal. The mines claimed their weights were thus and so. The matter was referred to us, and it was found that the cars could not contain within 10,000 pounds as much coal as they claimed was placed in the car. The moment we realized that the car body could not contain the coal we readily said that we could not make a claim for the coal. So I believe that Mr. Woodside, here representing the Pittsburg Coal Company, has a desire to be fair in making claims with the railroad company, and in turn the railroad companies should reciprocate.

On behalf of the Railway Club of Pittsburgh I want to thank Mr. Terry and the other gentlemen who have participated in this discussion, and I assure you that your presence is appreciated and that we bid you welcome again.

President—If there is no further business a motion to adjourn will be in order.

Mr. F. J. Kress—I am not a railroad man, but I have been invited to this meeting, and I wish to thank you for the invitation and to express my appreciation of what I have heard this evening. It has not only been interesting, but highly instructive, and I am very glad to be here.

I have learned a number of things to-night. I was surprised to hear that the railroad companies were going back in the matter of not being able to handle freight as safely as they used to, and I was surprised to find that they had the power of turning wine into water. But after hearing Mr. Shaw acknowledge that he was well treated by the railroads I have a suspicion where the wine went.

I was particularly interested in the package question. That is my business, and if it were not late and I had time to make a speech I would like to call the attention of the gentlemen who are shippers to improvements that sometimes can be made in a package. It is positively not a fact that even one out of a hundred would ship goods in defective packages for the purpose of making claims on the railroads; but it is positively the fact that many packages are not fit to be sent out with goods. It is a shipper's business to know whether or not his package is good. Of course the box man will always tell him that. In his determination to lessen the cost of the package the shipper often causes trouble for himself and the railroad as well. I was much interested in the troublesome carboys, and let me say right here that I do not think that the acid was spilled because the glass that was broken was in our boxes at all. We make the kind that don't break. We make them ⅞ of an inch thick. But there is just one little point that is quite overlooked, no matter if the lumber is three inches thick, and that is the cleats. If a cleat has a knot just where the joints come on the side it would part and thus cause the box to come apart.

I wish to repeat that I would not feel right if I left this meeting without saying thank you for the invitation.

Upon motion, adjourned.

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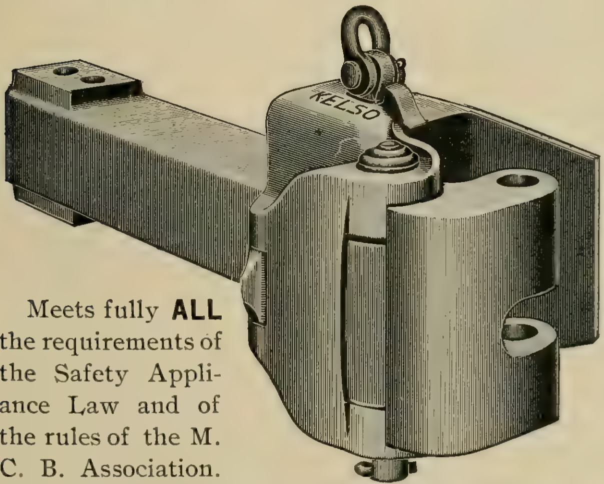

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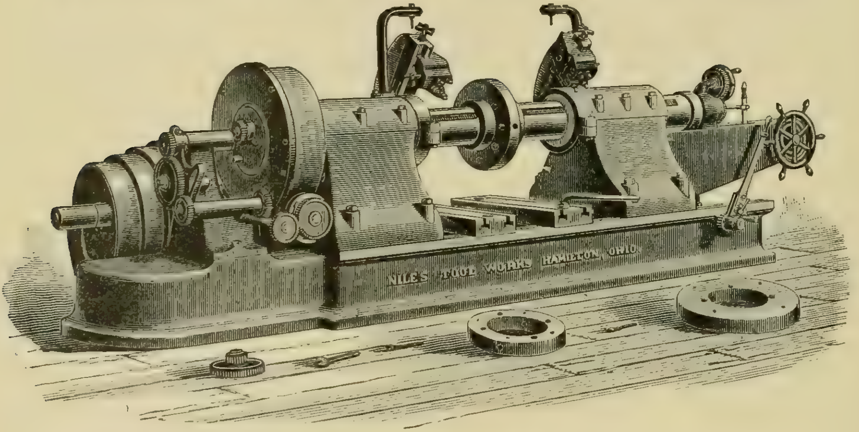
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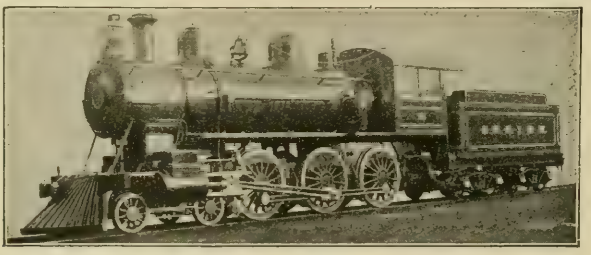

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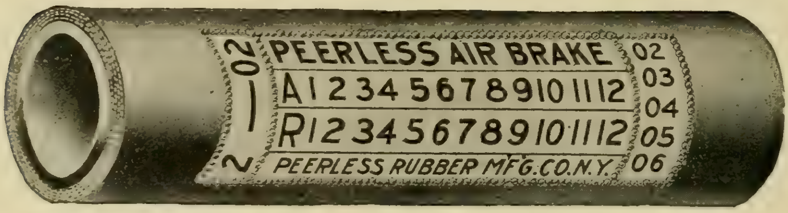
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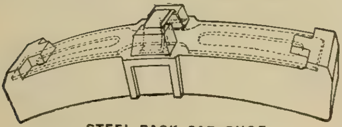

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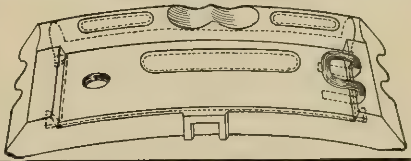

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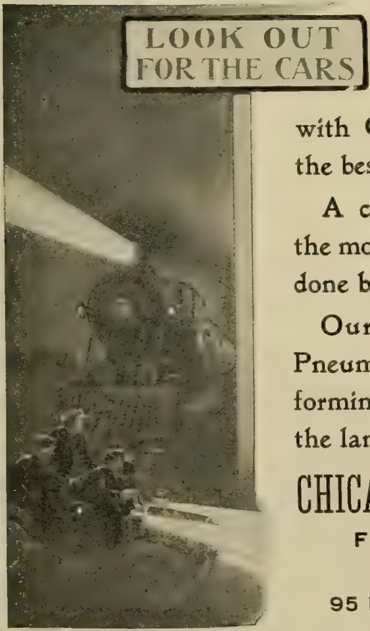

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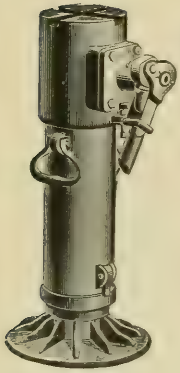

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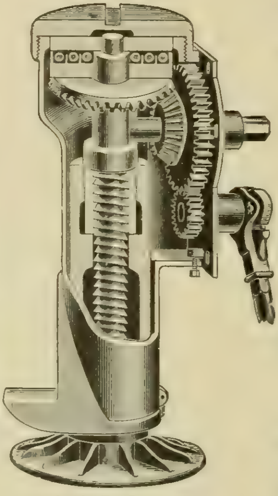

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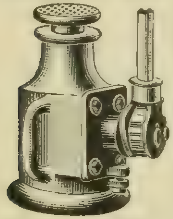

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VOL. IV.
No. 5.

Pittsburgh, Pa., March 24, 1905.

$1.00 Per Year
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Published monthly, except June, July and August, by the Railway Club of Pittsburgh, J. D. Conway, Secretary, General Offices P. & L. E. R. R., Pittsburgh, Pa.

Meetings held fourth Friday each month, except June, July and August.

PROCEEDINGS OF MEETING,
MARCH 24th, 1905.

The meeting was called to order at 8 o'clock p. m. at the Monongahela House, Pittsburg, Pa., with Vice President Alex. Kearney in the chair.

The following gentlemen registered:

MEMBERS.

Barnsley, Geo. T.
Barwis, Jos. Mc.
Bell, W. K.
Blest, M. C.
Booth, J. K.
Brand, Thos.
Brown, Benson E.
Brown, E. W.
Carson, G. E.
Coates, H. T., Jr.,
Connolly, W. E.
Conway, J. D.
Cottrell, W.
Courson, J. F.
Cox, Geo. W.
Dow, G. N.
Dyer, J.
Fox, J. B.
Gies, Geo. E.
Grove, E. M.
Harris, J. D.
Hastings, C. L.
Haynes, J. E.
Hood, D. G.
Horner, Jas.
Howe, D. M.
Hunter, Harry S.
Jenny, Jacob
Johnson, A. B.
Kearney, Alex.
Kessler, D. D.
Kleine, R. L.
Knight, E. A.
Krause, Julius
Long, R. M.
Malloy, M. A.
Weigel, Frederick S.
Milligan, W.
McFeatters, F. R.
McIlwain, J. D.
McKee, S. Frank
McMullin, F. V.
Porter, H. V.
Quest, F. E.
Redding, D. J.
Rodgers, C. W.
Smith, D. W.
Stark, B. F.
Stark, F. H.
Stucki, A.
Swann, J. B.
Sweeley, G. P.
VanKirk, T. F.
Wallace, M. E.

VISITORS.

Alleman, Chas. W.
Anderson, H. A.
Courson, Chas. L.
Louthan, C. W.
Platt, A. T.
Rawson, C. D.
Slemmer, J. C.
Smith, Sion B.

CHAIR: Gentlemen, the first order of business should be the reading of the minutes of the last regular meeting, but as they have been printed and are now in your hands, if there are no objections they will stand approved as printed.

Next in order is the reading of the list of proposals for membership.

SECRETARY: Mr. Chairman, the following names have been duly proposed for membership:

Hasell W. Baldwin, Vice President T. H. Symington Co., P. O. box 846, Pittsburg, Pa.

J. B. Daugherty, R. F. of E., B. & O. R. R. Co., 410 Cherry street, New Castle, Pa.

John B. Frost, Superintendent Car Service, Oliver & Snyder Steel Co., box 829 Connellsville, Pa.

H. Gulick, Jr., Ch. Ins. Car Dept., R. W. Hunt & Co., Glenshaw, Pa.

H. R. Hanlon, C. C. to Gen. Supt. B. & O. R. R. Co., Pittsburg, Pa.

C. T. Kalbaugh, Trainmaster, P. & L. E. R. R. Co. McKeesport, Pa.

J. Kirkpatrick, Master Mechanic, B. & O. R. R. Co. 354 Carlisle street, New Castle, Pa.

G. S. Mathiott, Agent, P. & L. E. R. R. Co. Glassport, Pa.

A. F. Moore, General Foreman Car Repairs, P. C. C. & St. L. Ry. Co., 458 Morrow Avenue, Carnegie, Pa.

Walther Riddle, Vice President, Sterling Varnish Co., 820 Ridge avenue, Allegheny, Pa.

J. H. Rosenstock, General Yardmaster, B. & O. R. R. Co., Division and Monroe streets, New Castle, Pa.

Geo. G. Walker, Contracting Agent, Erie R. R. Co., Park building, Pittsburg, Pa.

C. G. Smith, Chas. G. Smith Co., 604 Park building, Pittsburg.

C. D. Walworth, Representing Fairbanks, Morse & Co., Chicago, Ills.

George Porter, Assistant Cashier Passenger Department, Pennsylvania Lines West, Union station, Pittsburg.

C. W. Walsh, Station Master, P. & L. E. R. R. Co., General Office, Pittsburgh, Pa.

SECRETARY: These names have not yet been approved by the executive committee.

CHAIR: As soon as these names have been favorably passed upon by the executive committee the gentlemen will become members of the club.

TO THE RAILWAY CLUB OF PITTSBURGH.

GENTLEMEN :

Your standing Committee on revision of M. C. B. Rules beg to submit the following report :

Taking the Rules as a whole we are glad to reiterate our statement of last year, that is to say, that the Rules as a whole have proven quite satisfactory ; hence there is no need of any radical changes.

In view of the ever changing conditions there can reasonably be expected some nominal changes and additions that are worthy of due consideration. It is our purpose to offer such changes and additions, only, as will conform to the fundamental principles and true spirit of the M. C. B. Rules, with the object in view of expediting prompt movement of freight.

Some of our recommendations of last year that were not acted on favorably by the Arbitration Committee, we deem of sufficient importance to again embody them in our report herewith submitted.

CHANGES IN M. C. B. RULES.

Rule 10.—Owners' Responsible.

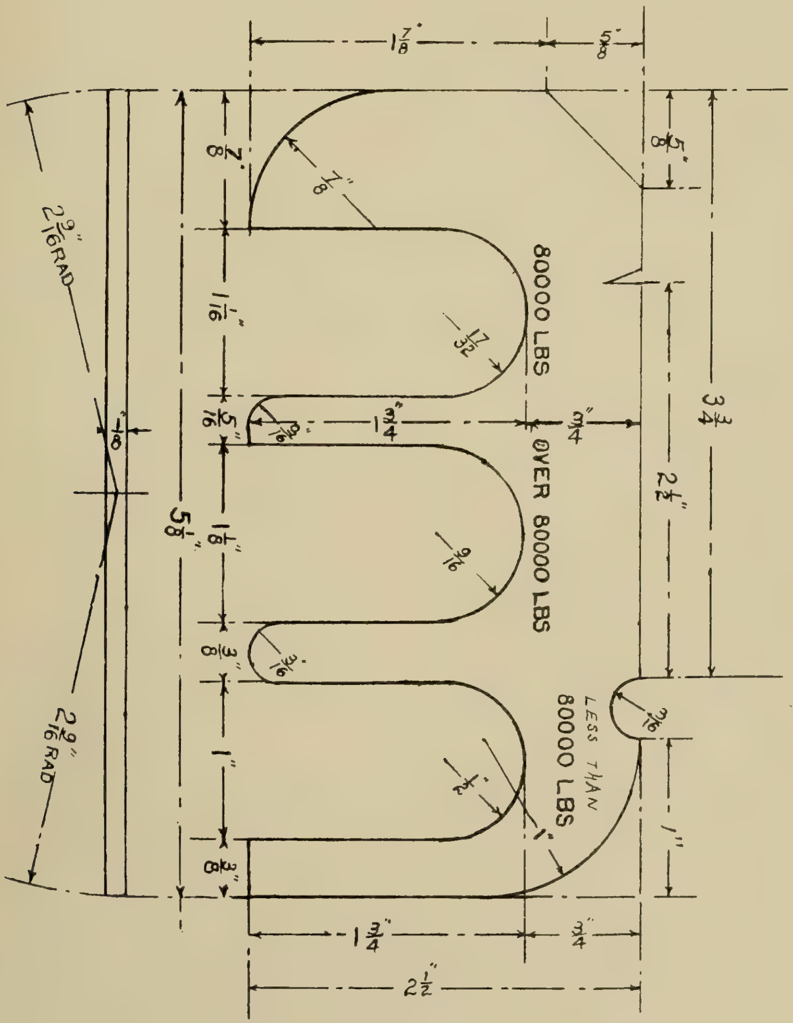
To read : "*Worn Flange.*" Wheels under cars of less than 80,000 pounds capacity, with flange having flat vertical surfaces extending more than one inch from tread, or flange one inch thick or less. Wheels under cars of 80,000 capacity with flanges having flat vertical surfaces more than ⅞ inch from tread, or flanges less than 1 1-16 inches thick.

Wheels under cars of over 80,000 capacity with flanges having flat vertical surfaces extending more than ⅞ inches from tread, or flanges less than 1⅛ inches thick

Owing to the decided increase in breakages of flanges under 80,000 and 100,000 pounds capacity cars when they are worn down to 1 inch and 1 1-16 inch in thickness respectively, we believe it is absolutely necessary to increase the worn limit of thickness of these flanges.

Rule 20. Fig. 1.

Change design of wheel defect gauge shown on page 6 to that shown in Recommended Practice, sheet "A" Proceedings for 1904, which embodies the worn coupler limit dimensions.



Rule 21.

Figures 3-4-4A and 5 to be changed to conform with dimensions given in revised Rule 10.

Rule 23.

Change note to read : "*All cars to have their light weight and capacity in pounds stencilled on them.*

We find that some Railroads operating tank cars with the liquid capacity stencilled thereon, and have issued instructions to Inspectors setting forth the maximum load including tare of the car that will be accepted with cars having Journals of certain dimensions. This necessitates the Inspector ascertaining the quantity and weight of liquid contained in the car. This information is not always available, and it is not considered practical. We believe that the marked capacity in pounds should be always stencilled on the car ; and also the light weight, as there are a large number of refrigerator cars running without stencelling of either capacity or light weight, therefore making it impossible to determine whether the axle is of proper dimensions.

Rule 29.

Add to Rule after the word "*Brakes*" in second line, "*Except torn air brake hose.*"

It is a well established fact that the practice of allowing the air brake couplings to be forcibly pulled apart is responsible for 95 per cent. of the torn air brake hose and damage to train pipes. and we therefore believe that the road handling the car should be made responsible for such damage. The practice of not parting the hose before separating the cars is responsible for a good many of the defects in service due to damage of couplings and hose, and with a view of enforcing this practice we believe the Rule should be changed as suggested.

Rule 34.—Owner's Responsibility Qualified.

Change to read : "*If car has air brake train line pipes but no air brakes, or steam pipes, or air signal pipes ; the pipes, fittings, hose and couplings on the car are at owners' risk, unless the car is stencilled that it is so equipped.*"

We believe that steam pipes, hose and couplings should be included in this Rule, as it is just as essential that freight cars be equipped with steam pipes when used in passenger service, as to be fitted with air brakes and signal fixtures.

Add Rule 42–A.

Cars intended to be equipped with couplers having 5 x 7 inch shank and so stencilled. If found with couplers having shanks of less dimensions, "*Delivering Company responsible.*"

Rule 50.

Omit this Rule since Buffer Blocks have been discontinued as a standard of the M. C. B. Association.

Rule 51.

Omit the words "*wood or iron buffer blocks.*"

Rule 55.

Add after last word "*repaired*" except as provided for in Rule 123.

Add Rule 59–A.

When Couplers and knuckles require replacing those conforming to the M. C. B. specifications must be used.

Rule 73.

Insert the words "*and metal spacing blocks*" after "*switch chains,*" making the last four lines read: "*Equivalent number of switch chains and metal spacing blocks of the same dimensions as the chains and metal spacing blocks so used on the cars delivered, or in lieu thereof, furnish a defect card for such chains and metal spacing blocks.*"

Since the metal spacing blocks have been included in the Recommended Practice "*Rules for Loading Long Materials on Open Cars*" they should also be included in the Interchange Rules with safety chains so as to facilitate interchange of cars.

Rule 75

The second paragraph of Rule 75 should be given a separate number and read as follows: "*M. C. B. repair cards and stubs must state whether solid or filled Journal Bearings are applied and length of bearing.*

Rule 92.

Omit, "*Coupler M. C. B. complete, new malleable iron*" as Standard specifications read, "*Couplers must be made of Steel.*"

CHANGES AND ADDITIONS.

Coupler, 5x5 inch shank, M. C. B. Std. Comp. New Steel, $8.50
" 5x7 " " " " " " " 9.25

Coupler body 5x5 inch shank, M. C. B. Std. One New Steel, $6.25 Cr. $1.05.

Coupler body 5x7 inch shank, M. C. B. Std. One New Steel, $7.00 Cr. $1.30.

Coupler Knuckle M. C. B. Standard, one new, $2.00, Cr. 45 cts.

Knuckle pin, M. C. B. Standard, one new, 20 cts. No credit.

Rule 103.

Insert the word "*Net*" before the prices charged for altering the height of cars and applying grab irons.

Rule 104.

Change application of carry iron bolts to read :

	Hour
Carry iron bolts applied 1 or 2 bolts on same end of car,	1
Carry iron bolts applied 3 or more on same end of car,	2
Draft Timber, short, extending to body bolster, one replaced,	6
Draft Timber, short, extending to body bolster, one replaced when its center sill has been replaced	1
Draft Timbers, short, extending to body bolsters, two on same end replaced,	9
Draft Timbers, long, extending beyond body bolster, one replaced,	9
Draft Timber, long, extending beyond body bolster, one replaced when its center sill has been replaced,	1
Draft Timber, long, extending beyond body bolster, two on same end, replaced,	12
Add brake chain renewed,	½
Add brake hanger repaired and replaced,	1
Add brake hanger replaced,	½
Add sill step removed and replaced, when secured with bolts or lag screws,	½
Add brake shaft renewed,	1
Add longitudinal truss rod saddle replaced,	1
Add one door hood applied,	1
Add "one head block," replacing at one end of car,	2

As might be expected the question of prices for steel car repairs will be subject to modifications as found from actual experience.

The price of 10 cents per rivet for all rivets has not proven equitable. We would recommend that the rule be amended so as to provide a further allowance for parts removed, in order to get at the rivet or rivets to be cut out and renewed. The following prices are to be allowed when no other charge has been made covering the same operation.

For raising and lowering one end of an empty car remove and replace one truck,	.10
Raising and lowering one end of a loaded car,	.15
Removing and replacing one swing motion truck bolster,	.10
Removing and replacing one truck bolster, rigid truck,	.50
Removing and replacing one M. C. B. Coupler, Yoke attachments,	.30
Removing and replacing one pair of wheels, pedestal type truck,	.60
Removing and replacing one pair of wheels, arch bar type truck,	.30
Disconnecting and reconnecting one brake beam,	.10

It will be noted that these prices do not correspond with charges allowed under rule 104 for the same operations. It will be recognized that the present prices allowed covers the removal of various parts, dismantling and disposing of worn out or defective parts, assembling of new parts together with other labor involved not required when certain good parts are removed and replaced, for the sole purpose of removing and renewing rivets, a charge for each operation would be allowed, for instance:

Raising and lowering one end of an empty car,	.10
Removing and replacing two pair of wheels from arch bar type truck,	.60
Removing and replacing one swing motion truck bolster,	.10
Disconnecting and reconnecting two brakebeams,	.20
10 Truck Spring hanger rivets removed and renewed,	1.00
	$2.00

The M. C. B. repair card should plainly state the location of part through which rivet has been renewed. The car owner knowing the construction of their equipment would readily recognize what other parts would have to be removed, in order to reach the rivets referred to.

Rule III.

Add price for all metal gondola cars of 40 tons capacity,
" Under 50 tons, 36 feet long over end sills.

Your Committee would further suggest that we submit through the proper channel further recommendations as follows:

1. That all car owners be required within a given time to equip all cars (not so provided) with brake beam safety chain attachment, to prevent brake beam from falling on track.
2. That welding of brake shafts be prohibited.
3. That some method of locating journal boxes be established, similar to the practice with passenger equipment. Some members of your Committee prefer to add to the present system of locating parts by "A" or "B" end, and add other initials and numbers, so as to locate other than journal boxes or contained parts. For instance : A journal bearing is renewed and it is noted on the M. C. B. repair card one 9 inch journal bearing "A" end R No. 1. This would cover a journal bearing applied to the first box on the right hand side of "A" end. If the bearing from the inside box is renewed, it would be designated by one 9 inch journal bearing "A"—R. No. 2. This same system would designate the location of damage to the side of the car body, location of draft timber, follower stops and many other parts. It has been in successful practice on several roads, and the extra clerical work is not appreciable, and any man that is competent to make out an M. B. C. defect card or repair card would readily grasp and execute the method.

Respectfully submitted,

W. J. Buchanan, J. B. Swann,
G. N. Dow, J. P. Yergy,
G. E. Carson, S. A. Cromwell,
A. Lamar, H. W. Watts,
R. L. Kleine, W. J. Knox,
Committee.

F. H. Stark,
Chairman.

CHAIR: I regret very much Mr. Turner is not with us to-night, because he has always manifested such an interest in the work of this committee, and I feel a little at a disadvantage because I was not here last year when this subject was discussed. It is my understanding, however, that the committee would like to have the report taken up rule by rule, and if that is your pleasure we might proceed.

MR. F. H. STARK: It was my idea that possibly some member may have some suggestion to make regarding some of the rules the committee has not referred to. And if it is agreeable to the club the secretary might call off the rules, commencing with No. 1, hesitating between each rule to give an opportunity to any member who has any suggestion regarding the rule. If none of the members here have any suggestions to make when we come to one where the committee makes a recommendation I will read the recommendation.

The secretary then proceeded to read the rules by number, and suggestions were made by members and by the committee as follows:

RULE 10.

MR. F. H. STARK: The committee recommends a change in rule No. 10. And by the way, we made a recommendation last year to the arbitration committee which was not favorably acted upon. We suggested that we increase the radius of the throat at the intersection of the flange and the tread. This year the committee makes another recommendation, that the thickness of the flange for cars of 80,000 and 100,000 pounds capacity be increased; 80,000 pounds capacity to $1\frac{1}{16}$ inch. and over 80,000 to $1\frac{1}{8}$ inch thick. Owing to the decided increase in breakage of flanges under 80,000 and 100,000 pounds capacity cars when they are worn down to 1 inch and $1\frac{1}{16}$ inch. in thickness respectively, we believe it is absolutely necessary to increase the worn limit of thickness of these flanges.

CHAIR: Gentlemen, this is a matter I think should receive some discussion. I have not given it very much thought, but I wonder if we realize what it is going to lead to, by increasing the present discarding limit of flanges? In point of fact, is it the reason for the majority of breakages of flanges, and do they not often break when they are larger than the present figure, quite as often as they do when they are down to the limit? At least that has been my observation. If you are going to discard these wheels when they get to these dimensions it will be very much felt.

MR. F. H. STARK: I would imagine that the B. & O. would have fully as serious trouble with flange breakage as any other road. However, we have representatives here from other mountain roads, and no doubt they could help us somewhat from their experience—or perhaps they do not care to tell us.

MR. R. L. KLEINE: The question of increasing the flange thickness in 100,000 capacity cars from 1 1-16 to 1⅛ is brought about by the numerous flange failures that are experienced when the flange gets down to 1 1-16. We made some experiments on the P. R. division, in fact, we looked into about a thousand wheels in which there were heat checks in the throat, etc., and out of that number about 60 to 70 per cent failed when the flange was below 1⅛ inch in thickness. Now, if we can eliminate that 60 to 70 per cent of flange failures by increasing our flange thickness 1-16 inch under these cars we think we ought to do it.

MR. F. H. STARK: We have the chief joint inspector from Youngstown here, and we would like to hear from him.

MR. JOSEPH DYER: I don't know that I have anything to say on this subject so far as flange breakage is concerned. I could say that my experience with the Lackawanna in a mountainous region was that we had just as many wheel flanges break on the lower capacity cars as on the higher capacity cars. And it seemed to me that a better metal in the wheel was what we wanted rather than cutting down the wearing limit of the wheels.

CHAIR: When you refer to light cars what capacity do you mean?

MR. JOS. DYER: Forty thousand pounds capacity cars with flanges in good condition. The majority of the breakages were due to heat cracks so far as my experience goes. And I don't know that we would get any less heat cracks, seams in the throat of the flange, by giving it a greater amount of flange thickness or permitting less wear.

MR. JULIUS KRAUSE: I would like to say a few words on this subject of flange thickness. While my friend over here says that flanges break as often with light capacity cars as with large capacity, my experience in the Allegheny mountains, in fact over the P. R. R. division, is that there is not 5 per cent of the broken flanges on cars below 80,000 pounds capacity, and the 80,000 cars are few when we compare them with the 100,000 capacity cars.

It has also been a great worry to me. Every time we have an accident with a broken flange, of course they want to know the thickness of the flange, its condition, age, the maker, the kind of material, etc.

This gentleman says heat crack. I had a superintendent of a wheel foundry say to me, Krause, I don't quite agree with that crack theory, for the simple reason that we have them break on pony trucks on engines, and they have no brake on at all. Where would the heat come from?" I told him I couldn't explain that, but the cracks are there. But I find as a general thing they are 1″ and 1 1-16″ and also some breaks at 1⅛″, though but very few. The trouble is with our 100,000 pound capacity cars. When the throat gets worn and the flange becomes sharp then these cracks appear. And I think it is still a question what causes the cracks. A great many think it is not the heat at all, but that it is the great strain. We have got 18,000 pounds on every journal and when we run over a track where we have 6½″ of elevation and compress our truck springs on the lower rail and the load sways over, that pressure is greatly increased, and I have no doubt it is hard on cast iron flanges.

Our friend says we should have better metal. That is a good thing, but I am told by people that make them that we can't make it out of pig metal. We ought to get steel wheels? Then we will have to issue more bonds. I think it would be a good plan to follow the committee's idea and risk 1⅛ inches. Let us go slow on that, because we will have to throw a good many wheels away. But I think you better do that. The superintendent sends over to me every day the accident reports. "Put an estimate of cost on them." Take an accident from one of those broken flanges and put an estimated cost on and I dare say that you could buy a great many wheels for that amount. I think it will pay to break them up at 1 1-16″ and run the risk.

MR. JOS. DYER: The reason I suggested that we wanted wheels made of a better material was that in my experience up in the mountains we found that wheels made in certain places under certain conditions would break in greater proportionate number than the number of cars handled. I take that as pretty good evidence that there are good and bad wheels.

MR. W. COTTRELL: Mr. President, I believe as the committee does that the thickness of the wheel flange should be increased, especially on 100,000 pound capacity cars. I am not able to produce figures of flange breakage under the limit now, but we are having more trouble with broken flanges on 100,000 pound capacity cars than at any other time, and I think we should agree in the recommendation.

MR. G. E. CARSON: Take two points: in particular, where our 80,000 and 100,000 pound capacity cars go up trestles and around very short curves, and in almost every instance where a flange is worn down to the limit it will simply push the flange right off. And just at those points, too, the parties who are delivering cars watch them very closely to see that they are not worn down to the limit, and if they are they refuse them. I will say this, that when our 80,000 and 100,000 capacity cars came on the line we never had any flange failures until they were in service and worn down to the limit, except that we have had flanges drop off due to longitudinal seams. I am heartily in favor of increasing the thickness. I think it very necessary.

MR. W. E. CONNOLLY: Mr. President, I think we are on the wrong line altogether. I think the railroad company ought to spend a little more money increasing the switches and frogs and make the flanges in proportion to the rest of the wheel and then they would not have so many broken wheels and would not be looking around for steel wheels.

We have now on the B. &O. wheels $2\frac{1}{8}$ inches through the throat. If you put chill enough on that wheel to get a good chill in the throat you are going to have the flange of the wheel chilled, where consequently it is going to crystallize from reheating constantly and it is going to break. In these rules as adopted we have $\frac{1}{4}''$ to come and go on.

The manufacturer is going to be a great sufferer. That wheel will have to be replaced in about a year. The railroad companies want the wheel guaranteed, and if wheels are guaranteed we will raise objections.

MR. F. H. STARK: I was not aware that the manufacturer placed any guaranty on worn flanges. I do not know of any case where they do. Personally I favored our recommendation of last year, to increase the radius at the throat of the flange. I believe that could have been done with less hardship on the owner. There is no question that the condition of the flange has something to do with heat cracks. Where the flange is worn vertically nearer to a right angle with the tread we have a greater area of friction bearing between the flange and the rail than we do with a flange that is more nearly its normal shape. This is augmented, of course, by the increased braking power on account of the increased tare weight of the car, also by the increased load. All these things together cause an increased friction per square inch between the flange and the rail, which no doubt causes these heat cracks. In my observation I would say that of the flange failures 95 per cent of them are flanges that are worn down to the limit, or nearly so. I never have seen more than half a dozen cases where the flanges were practically new.

On motion the recommendation of the committee is adopted.

RULE 18.

MR. JAS. HORNER: There is a point under rule 18 on which I have had decisions given one way and I have had them given the other. "Chipped flanges." If the chip is on the outside of the flange and exceeds 1½" in length and ½" in width or ⅛" past the center I would like to ask, does it have to be the first two dimensions before you can condemn it, or can you condemn a wheel on any one of the three defects separately?

MR. F. H. STARK: My understanding of the rule is that it has to exceed the limit both ways. I raised that question at the Chicago Railroad club and some one made the statement that it seldom ever happened that a chipped flange exceeded the dimensions one way and not the other. So that there was no action taken on the matter.

CHAIR: I think the rule has been up several times, and it has always been decided as Mr. Stark interprets it.

RULE 20.

MR. F. H. STARK: The committee recommends a change in the wheel defect gauge to conform to our recommendation as to change of rule 10. Then, too, the Master Car Builders' association failed to make the correction in the M. C. B. book of interchange rules last year to conform to the action taken by the convention. This wheel defect gauge also answers as a coupler gauge.

MR. JOS. DYER: The adoption of rule 10 necessitates the adoption of this also.

CHAIR: I think that is correct. Also the same can be said for rule 21, and if there are no objections we will pass them.

RULE 23.

MR. F. H. STARK: The committee recommends that all cars bear the capacity stencilled in pounds. Some cars are running with the capacity in gallons and it is quite impossible for the inspector to determine whether the journals under the car are up to the limit as to dimensions.

If there is no objection to this recommendation we might pass along without approving them separately and approve the recommendations as a whole later.

CHAIR: In connection with the rule, I would like to ask if that isn't the rule where you mention tank cars? And was it not taken up last year and some objection offered on the part of some of the roads, and was finally turned over to a committee of the Master Car Builders' association?

MR. STARK: I do not remember whether that included the tank cars, I know it did the refrigerator cars.

MR. R. L. KLEINE: I think I can answer that question. The tank car committee, of which Mr. A. W. Gibson was chairman, got into some difficulty about mentioning gallons on account of the specific gravity of some of the liquids carried, such as sulphuric acid, being two to one, and on reconsideration that committee thought it would be advisable to stencil the capacity in pounds on the tanks that no matter what was carried in the tanks the loader will know just how many gallons to put in that tank to make up the weight of the car.

CHAIR: Then I understand that would be acceptable?

MR. KLEINE: Yes sir.

MR. JOS. DYER: I think the intention of the Master Car Builders' association was that all cars be stencilled in pounds, no exception whatever—freight cars, I mean, and tank cars are certainly freight cars.

MR. J. B. SWANN: We consider that the first thing we must do is to bring the matter before the inspectors in just as simple a way as possible , not that he may calculate the weight of each article in gallons, but just that he may know its capacity, that he may know at a glance that it is of only so many pounds capacity. Then he comes up to your office or my office and we can tell him in a minute. Consequently, the pounds would be preferable in every way.

CHAIR: I think we might pass that.

RULE 29.

MR. F. H. STARK: The committee would recommend that the road operating the car be responsible for torn and broken hose. The present rule, taken literally, would make the operating road responsible, but the arbitration committee has made a decision in effect that the owner shall be responsible for torn and broken hose. We believe that the practice of uncoupling cars without separating the hose is responsible for the greater part of the damage to air hose. The Westinghouse Air Brake Company do not claim that their coupling is automatic under all conditions. During the winter weather when there is snow and ice the hose couplings are liable to be frozen up, and to separate them without upcoupling the hose occasions a fracture at the nipple. And the committee believes that a road that abuses cars in that manner should be responsible for the results.

MR. DYER: There can be no question that the separating of the cars without the parting of the hose causes so many to be torn off. It is so in our country and I presume it is everywhere, and I think myself the hose should be separated by hand. And so far as I know the roads in general have given instructions that air hose shall be separated by hand. Those rules are not lived up to by train men and the hose are torn constantly. And inasmuch as it is a recognized fact that the separating of cars without parting the air hose by hand is the cause of so many hose failing, by making the handling road responsible each of the companies would be able to save considerable money, as they would then enforce the rule.

MR. J. B. SWANN: We have gone into this matter very largely, and while we feel that we have an automatic hose that will uncouple under certain circumstances and conditions, we have not yet obtained an absolute perfect coupling. In case of a slight leak, you know the result. To make a hose absolutely automatic in uncoupling is almost impossible in our opinion.

MR. GEORGE N. DOW: I think that hose torn by cars uncoupling without being parted by hand, the operating road should be responsible for and I think the committee has taken the right stand on it.

A MEMBER: Mr. Chairman, I don't know as I can say very much in regard to this matter. It is a question in my mind whether you are going to do any better by passing this proposed change in the rules. It looks to me as though it would only be a standoff. We all know that brakemen get very tired when it comes down to uncoupling hose. They much prefer to give the engineer the signal and let him go ahead and let the result be what it may. If you would adopt this proposed change and make the delivering company responsible it would only act the same way with the other roads. I do not see where you would gain much by it. To make the owners responsible we have to pay for what they do and they have to pay for what we do, and by the change of this rule I do not see that you are going to have very many more dollars in your coffers at the end of the year. If you could devise some measure by which you could make the trainmen uncouple the hose to avoid that, then you would do something of more benefit than changing this rule as proposed.

MR. JULIUS KRAUSE: If the party tearing the hose has to pay for it he will certainly look around to find some measure to prevent them being torn. Our experience is, as Mr. Swann says, that if the brakeman opens the air hose by force when they are new they will part with 24 pounds of a pull. But we also know that when they are frozen and you bend that coupling, the front lug, 1-16 inch, and it takes 600 and some pounds to pull apart. The result is that you do not always tear that hose in two, but you will tear the inner tube and damage it and you will have leaks in your train line at the cross-over pipe, and it causes us a lot of worry,, especially the car inspectors that have to "sleep under the car."

MR. GEORGE GIES: If the inspector had to do with the cutting of the hose and we would instruct him he would naturally use better judgment than a trainman would. But conceding all that, how are you going to stop the trainman from doing that? There is a lot of hose cut where there isn't anybody to watch him and he knows that. He will go right along as he has been doing unless you have some way to catch him and then punish him. As far as the adoption of the rule is concerned I am not opposed to it, but I think it will not help matters particularly.

MR. R. L. KLEINE: I can't altogether agree with Brother Gies on that. If the inspector will uncouple the hose he claims that good results will follow. If we can make the inspector uncouple 95 per cent of them we will get 95 per cent good. Let us make the inspector uncouple that hose in the yard whenever we can.

MR. GIES: Then you will have to have 95 per cent more inspectors.

MR. JULIUS KRAUSE: I received instructions about six months ago to uncouple the hose. We have 1,200 cars westbound and one man at night and one man in the day upcouples those hose and does other work beside. And we have also adopted a little rule that we have been trying to train men that to tear hose apart without upcoupling means a vacation of two weeks, and we have far less torn hose.

MR. J. B. SWANN: We have investigated it to such a degree that we find it necessary to hold the switchman. He is not head inspector and he is not a man entirely from the car department. Consequently, we have made arrangements for the uncoupling of the hose by the trainmen and by the switchmen.

MR. JOS. DYER: The whole discussion seems to indicate that it is the fault of the employe of the road upon which the car is. Such being the case, it seems absolutely necessary to adopt this to make the handling road responsible.

MR. G. E. CARSON: Just so long as the manufacturer makes couplings and notifies every one from one end of the road to the other that they are automatic and will pull apart and you can do most anything with them, you will never be able to get anybody to cut them. I would rather see the hose fixed so that if you pull them apart it would result in a lot of damage if you did it. I think it is a mistake on the part of the manufacturers to say at all that they will part automatically.

Now as to this rule, even though we do not accomplish anything as far as profits are concerned, it is the intent of the rules to have all delivering companies pay all bills originating through unfair usage, and I think this is unfair usage. I am heartily in favor of this change in the rules.

CHAIR: I understand the point you make and it would be very nice in theory, but I wish you would telephone me when you get the men to cut 95 per cent of the hose and I will come over and look at it.

MR. R. L. KLEINE: I would like to invite Mr. Chairman either to Wall, Altoona, Harrisburg or Philadelphia yards with pleasure.

MR. G. E. CARSON: I will also invite you to McKees Rocks yards.

RULE 34.

MR. F. H. STARK: The committee would recommend the adoption of steam pipes as set forth. The present rules include all signal pipes without the airbrake cylinder or reservoir. We propose to add to this steam train line. Quite a number of roads are operating special cars in their passenger trains during the winter months when it is necessary to carry steam back through the coaches. And when cars are so equipped and so stencilled the owner ought to be protected. If the car is not so stencilled then the steam equipment is at the owner's risk. It is simply making an addition to the present rule.

RULE 42.

CHAIR: If there are no objections we might pass on.

MR. F. H. STARK: The committee would recommend that we insert; that cars originally equipped with 5x7 shank couplers and so stencilled if found with couplers having shanks of less dimensions that the delivering road be responsible. The M. C. B. A. have adopted two standards of dimensions of shanks. The larger coupler costs more money, consequently if a road goes to the expense of putting in a heavier coupler it ought to be protected.

RULE 50.

MR. F. H. STARK: Since the M. C. B. A. has discontinued the cast iron or malleable iron buffer blocks as a standard the committee would suggest that the term buffer blocks be omitted.

MR. DYER: I would like to ask whether wood or iron buffer blocks as put down in this rule does not also mean dead wood. It is not mentioned in any other rule.

CHAIR: I do not think it does. Mr. Stark, ,how is that?

MR. STARK: I would understand that it does not include the ordinary wooden head block. The wooden head block is usually more or less damaged on account of the coupler horn coming in contact with it, so that it is not considered in the combination.

RULE 51.

CHAIR: That seems to be the same.

RULE 55.

MR. STARK: Rule No. 55 reads as follows: "Any car having defects which render it unsafe to run, unsafe to train men or to any loading suitable for the car, may be repaired." There might be a misunderstanding regarding where to draw the line as to when a car should be sent home under rule 123. A car might have the majority of the flooring decayed, perhaps some of the longitudinal sills. The road operating the car would not be warranted in making such extensive repairs, but should first get authority from the car owner before making repairs to that extent. So the committee would simply refer to rule 123 so as to bring it to the attention of the party interested.

RULE 59.

MR. STARK: The committee would recommend that when knuckles require replacing those conforming to the M. C. B. specifications must be used. This would prohibit the introduction of knuckles made of other than steel.

RULE 72.

MR. STARK: I would like to refer to rule 72. One of the roads represented on the committee,, after the committee had considered the changes in the rules, took it upon themselves to write to me as chairman, suggesting that I bring the matter before the club in its order. In rule 72, which relates to the application of wheels and axles. When second-hand anxles are applied under conditions which make them chargeable to the owners, it demands that journals of such axles applied should not be less than $\frac{1}{8}$ inch above the limit dimensions given in rule 23.

About two years ago the M. C. B. A. increased the standard dimensions of car axles, but they have never increased the minimum dimensions of car axles that would be acceptable in interchange of cars. It is proposed that when wheels are being changed that axles applied must conform to the minimum dimentions, a little larger than are at present minimum dimensions for interchange, with a view to discarding axles that are now in service that are actually below the minimum dimensions. The idea is that if a road removes a pair of wheels from a foreign car they will put under that car axles of a certain dimension, which they propose to embody in the rules. The axle removed, if it does not measure up to these new prescribed limits, should be scrapped. This would in no way affect the interchange of cars ordinarily; it would simply apply where wheels are being removed. Mr. Kleine is a little more familiar with this and he can explain it better.

MR. R. L. KLEINE: The limits which are given are those which are based upon the present M. C. B. standards. The committee made certain recommendations in 1902 to the association as to what the size to the center of axle where it is applied to journals should be for certain capacity cars, but that was never incorporated in the M. C. B. rules of interchange in rule 23. On account of the large number of failures of axles of certain dimensions it was suggested for bringing about a reform to gradually raise our axles to the M. C. B. requirements in the following manner. That is, if you have to remove a pair of wheels or axle from a foreign car for a defect in those wheels or axles, that you cannot replace them at all with other than standard M. C. B. Now to tabulate a little farther and in order to use up the majority of the axles, it will give certain limits. For instance, a flat car weighs 20,000 pounds less than a refrigerator car, therefore it would not be necessary to have as large an axle under a flat car of the same capacity as a refrigerator, because the light weight of the car is 20,000 pounds less. Under these rulings we give for 161,000, that is maximum weight in pounds capacity plus 10 per cent, plus light weight —that is, the inspector would go to the car and see what the capacity is and add 10 per cent for a 100,000 pound capacity car that would be 110,000, plus the light weight. Then he would pick out his axle.

CHAIR: Is it your intention to put that data under rule 23?

MR. KLEINE: No sir, we can not put that under rule 23, otherwise it would enable any inspector to hold up a foreign car and change the axle underneath that car. This is to be put in rule 72 simply for the change of axles, that when axles are changed no other can be applied to the foreign car but these dimensions. In that way we will gradually get out the weak axles and get axles standard to the association under the cars. A road owning cars having axles below these limits can still keep on running them, but of course they will understand that if the wheels fail on a foreign road or an axle fails, the axle will be credited as scrap.

CHAIR: I understand these are the M. C. B. dimensions?

MR. R. L. KLEINE: These are M. C. B. dimensions, the additional number of weights given here being based on the M. C. B. basis.

CHAIR:: When were they calculated? Is it not a part of the report made by Mr. Nelson some years ago?

MR. KLEINE: Yes sir, and it is based on that calculation as adopted by the M. C. B. A.

CHAIR: Then these figures do not clash with those in rule 23?

MR. KLEINE: Yes sir, except for the 100,000 capacity it is the same.

CHAIR: Does not rule 22 read that the journals should be $\frac{1}{8}$ inch larger?

MR. KLEINE: That is also incorporated in the rule. The rule as we have suggested it is as follows:

"On and after September 1, 1905, when axles are applied to foreign cars, on account of defective wheels or axle, they must not be less than the following prescribed limits, and when applied under conditions which make them chargeable to the owners the diameters of journals of such axles applied must not be less than ⅛ inch above the limit dimensions given below:"

Minimum Weight, (Lbs.) Capacity + 10% + Light Weight	Minimum Diameter of Journal Inches	Wheel Seat Inches	Centre Inches	Original Journal Length Inches.
161,000	5	6¾	5⅞	10
132,000	4½	6¼	5⅜	9
102,000	3 15/16	5⅝	4⅞	8
96,000	3¾	5½	4¾	
90,000	3⅝	5⅜	4⅝	
83,000	3 9/16	5¼	4½	
76,000	3 7/16	5 1/16	4⅜	
69,000	3 5/16	4 15/16	4¼	
62,000	3¼	4¾	4⅛	
66,000	3¼	4¾	4¼	7
62,000	3⅛	4⅝	4⅛	
57,000	3	4½	4	
52,000	2 15/16	4⅜	3⅞	

All cars must have their capacity in pounds stencilled on them, 10 per cent of the capacity should be considered as additional for overload. There should be no allowance made above the figures given under the heading "Maximum weight."

We keep that ⅛ limit the same as before.

MR. STARK: Do I understand that the M. C. B. A. ever adopted these minimums?

MR. KLEINE: Your understanding is correct in regard to the A, B, C and D axles. We give a larger number of weights closer together, but they are based on the same calculation.

MR. STARK: But was there any action taken by the M. C. B. A. approving of these minimum dimensions? The maximum sizes were,, but I never knew that the minimum sizes were—the maximum sizes for a new axle standard.

MR. KLEINE: In the chairman's report he gives the minimum sizes, though that was not adopted by the association.

MR. STARK: I hardly know what would be the result of those changes if put into effect. It might possibly throw out a lot of reasonably serviceable axles. So far as my experience goes I do not learn of very many axles failing to any alarming extent. I know that thousands of cars are running with axles of less than M. C. B. minimum sizes. And if you were to introduce minimum sizes as suggested here it might work hardship on some roads. I would suggest that this matter be referred to the arbitration committee not as a recommendation from this club, ,but simply for their consideration.

MR. KLEINE: I would say for the benefit of Mr. Stark that the committee appointed by the M. C. B. A. to go over axle specifications was due to the large number of axles failing in service.

MR. KRAUSE: Do I understand that rule 23, which gives us the limits now at interchange points—if a 100,000 pound capacity car comes along and has a journal under it less than 5 inches that the receiving road would condemn it, or need not receive it, or take it into its shop and replace it with a 5″ journal—would it destroy that?

MR. DYER:: If a 100,000 car is offered with journals less than 5 inches it can be thrown out and the journal condemned.

CHAIR: What is the limit of 100,000 capacity cars under this new set of figures?

MR. KRAUSE: The same as the old figures. This affects the interchange in no way. This is entirely for the application of axles.

CHAIR: Then that will not interfere with the point you raise, Mr. Stark.

MR. STARK: As wheels and axles are removed so frequently and there are so many kinds of axles, axles will be scrapped which under the present rules would remain in service. Had we not better let this run on another year until we get a little more light upon the subject?

MR. J. B. SWANN: I was very much in favor and also recommended the increase in diameter, ,and as Mr. Stark recommends that it be submitted to the arbitration committee, I would consider that important as an idea originating with the club. It is something that is going to be brought about on account of the increase of capacity of cars so rapidly, and I believe the club ought to get the credit of submitting it to the arbitration committee.

CHAIR: Of course that remains with you, gentlemen. But I must say I favor your recommendation indorsed by Mr. Swann. It seems to be it would be a very good idea to refer it to the arbitration committee, rather than make it part of this report. As Mr. Swann says, it belongs to the club, and as far as we are concerned it would be treated with the report, but not as a part of the report.

MR. STARK: If it is in order, I move that the suggested change in rule 72 be embodied in the report as coming from the Pittsburg Railway club simply for their consideration.

The motion was duly seconded and carried.

RULE 73.

MR. STARK: The M. C. B. A. has adopted standard spacing blocks where cars are used in twin loads. We believe this should be included in rule 73, together with car chains.

CHAIR: I do not believe metal spacing blocks will pass. What would you say, Mr. Cottrell?

MR. W. COTTRELL: It is all right, Mr. President.

RULE 75.

MR. STARK: The committee would report that the M. C. B. repair card indicate the length of the journal so that the billing clerk can check up the bills. As it is, it is impossible for the billing clerk to know positively the length of journal under every car,, therefore he cannot say whether they have been charged with the proper weight of brass or not. We simply provide that the inspector show the length of the journal.

RULE 88.

MR. KLEINE: If we make the suggestion in rule 72 it will be necessary also to make the same suggestion in rule 88, change the last sentence to read as follows: "Axles removed below the journal, wheel seat or center of axle limit for the respective length of journal prescribed in rule 72,, to be credited as scrap."

MR. STARK: I would suggest that that be included in the reference to rule 72, and if it be in order I move that reference to rule 88 be embodied in our reference to rule 72.

The motion being duly seconded was carried.

RULE 91.

MR. KLEINE: Another in the same line that ought to go in the same place. Add to this rule "and when credited as scrap account of being below the minimum limit for the length of journal prescribed in rule 72, having been drawn for other defects, actual dimensions, together with maximum weight, should be given to show the variation from the limit prescribed."

MR. STARK: If no one has a suggestion to make on a rule not referred to by the committee, I suggest that we omit the reading of the rules and just take up the ones as touched on by the committee.

CHAIR: I think that is satisfactory, and if there are no objections we will go ahead that way.

RULE 92.

MR. STARK: We propose to omit the price for malleable iron coupler as the M. C. B. A. have adopted steel as the standard for M. C. B. coupler. If there is no criticism we will pass that one.

Under the same rule we suggest prices for steel couplers with 5x5 shanks etc., with a credit as printed.

RULE 103.

MR. STARK: There is some question as to whether the prices in the rules are net prices or whether there should be a credit. We suggest that they insert the word net.

RULE 104.

MR. STARK: The committee suggests the number of hours chargeable for various operations. If any one has any suggestion to make as to the number of hours, we are ready for suggestions.

CHAIR: I believe I would pass that, Mr. Stark. That brings us to rule No. III.

MR. STARK: The latter part of the suggestion with regard to rule 104 I would like to have some expression as to prices for steel car repairs. "It will be noted that these prices do not correspond with charges allowed under rule 104 for the same operations," etc. And we enumerate the charges allowed for the various operations. This refers to labor only, the material, of course, would be added to that. If any one has suggestions to make to this I would like to hear it, as I imagine that the matter of increasing the charges allowed for steel car repairs may be a little crude, but this will serve as a basis for the arbitration committee to consider.

RULE 111.

Under this rule there is no price given for steel car bodies of 80,000 pounds capacity.

Your committee would further suggest that we submit through the proper channel further recommendations as follows:

1. That all car owners be required within a given time to equip all cars (not to provided) with brake beam safety chain attachment, to prevent brake beam from falling on track.

2. That welding of brake shafts be prohibited.

3. That some method of locating journal boxes be established, similar to the practice with passenger equipment. Some members of your committee prefer to add to the present system of locating parts by "A" or "B" end, and add other initials and numbers, so as to locate other than journal boxes or contained parts. For instance: A journal bearing is renewed and it is noted on the M. C. B. repair card one 9-inch journal bearing "A" end R No. 1. This would cover a journal bearing applied to the first box on the right hand side of "A" end. If the bearing from the inside box is renewed, it would be designated by one 9-inch journal bearing "A"—R No. 2. This same system would designate the location of damage to the side of the car body, location of draft timber, follower stops and many other parts. It has been in successful practice on several roads, and the extra clerical work is not appreciable, and any man that is competent to make out an M. B. C. defect card or repair card would readily grasp and execute the method.

I would say that this system has been practiced on the Lake Shore and one or two other roads a long time, and Mr. Dow is here and can tell us whether it is a proper provision or not.

MR. G. N. DOW: It is certainly a great help to us in the office and all the men on the road thoroughly understand it, and not only the Lake Shore, but other roads have adopted it.

MR. JAS. HORNER: I would like to ask what is the left and right side of a car. Do you go in the car or do you stand facing the draw head? Why I ask this question the Miner Draft people in Chicago in numbering their draft castings they have them marked R. and L. and according to their initials they have the right casting marked L. and the left casting marked R, facing the car, if you stand on the outside of the car.

MR. STARK: There is no question that you determine the right and left side by facing the end of the car from the outside. I presume the Miner people haven't given that matter any consideration. But unless someone understands it differently I believe we can assume that we are to face the end of the car in determining what is right and left.

I want to say in connection with this Rule III, that when I was with the C. L. & W. we introduced this system of locating parts, and our inspectors were perhaps not up to the average of intelligence, and after we sent out explicit instructions as to how to execute this practice, we had no trouble whatever in enlightening the inspectors as to just how to carry it out. As to the question of extra clerical labor, there is nothing in it at all, because a man gets accustomed to filling that out and he will put in R and L or whatever it may be and the extra amount of time is not appreciable.

MR. JULIUS KRAUSE: I don't think this committee is sticking to its promise about not getting our M. C. B. book any thicker. While they say this don't amount to much, when you worry with your inspectors to get them to understand even the A and B end, and then about the time you have him instructed and he is a good man, he tells you he is going to go to firing, and you have to take hold of a new man and go through the same thing all over again. This book is pretty large now and I hope you will not get it any larger than you can help.

MR. G. E. CARSON: Of course I would like to see something whereby we could tell what part of a car the journal bearing is applied to. But I side with my friend Mr. Krause not to burden the inspector with any more A and B and R and L. You all understand that the first thing when a car comes into the yard is to go to the inspector and hurry him up. He gets a book and a box of tacks and a lot of cards—and I expect now they have got aprons with four or five pockets—and they go down like a peddler and he puts in a journal bearing and his hands are all over grease and he is a sight. And three or four train men walking behind him asking him why he don't hurry up. He goes back to his shanty and says, Well that was A end or B end—and down it goes. I am sure there is not one out of ten men who make their report out down in the yard.

MR. STARK: While that might be true out in the yard, Mr. Carson will acknowledge that it is not so in the repair tracks and in the shops and there is where a great deal of the work is done. You can't get an inspector to do much repairs now days and the work is generally done by the repair man who follows the inspector. I know from experience that this plan is feasible. It has been followed on the Lake Shore for five or six years.

CHAIR: That finishes up the report.. I understand you wish to have it voted upon.

On motion of Mr. Krause, duly seconded, the report submitted by the committee with the additions that have been suggested and approved, are ratified and approved as a whole.

On motion adjourned.

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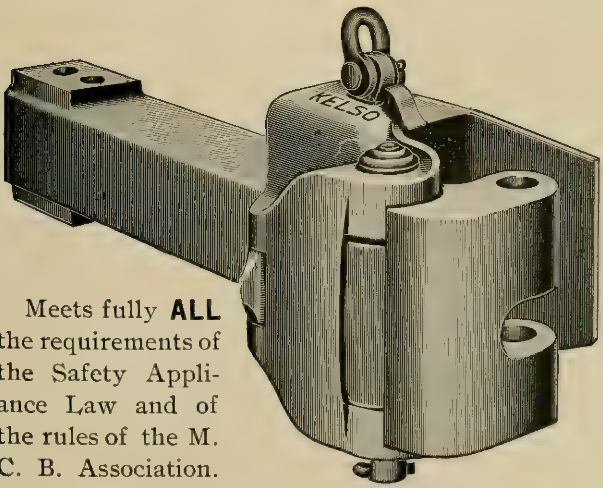

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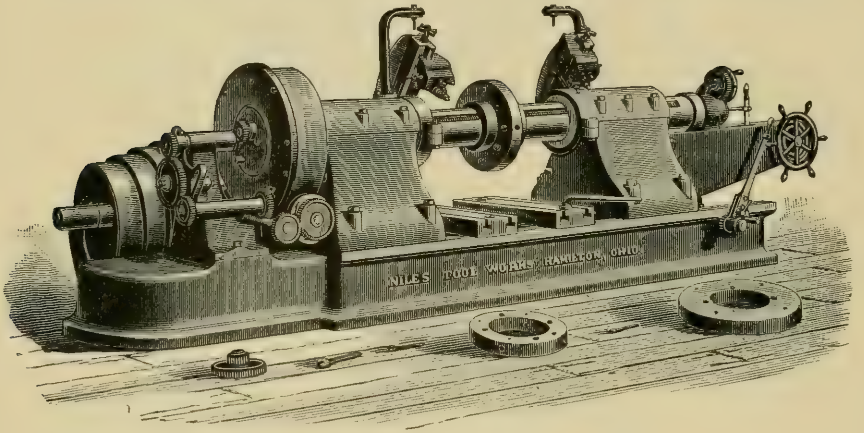
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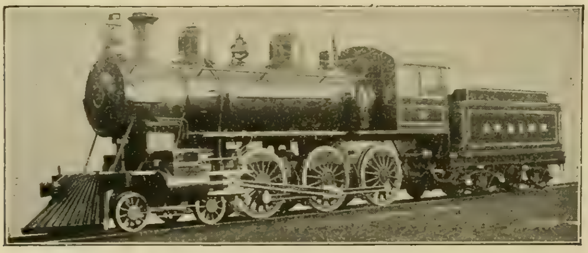

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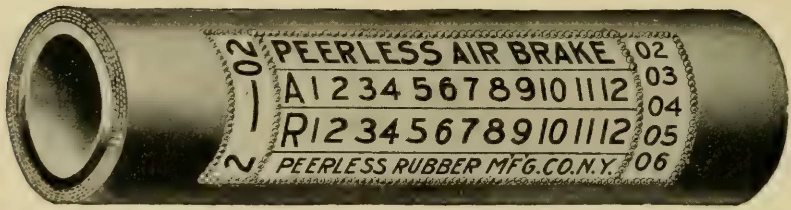
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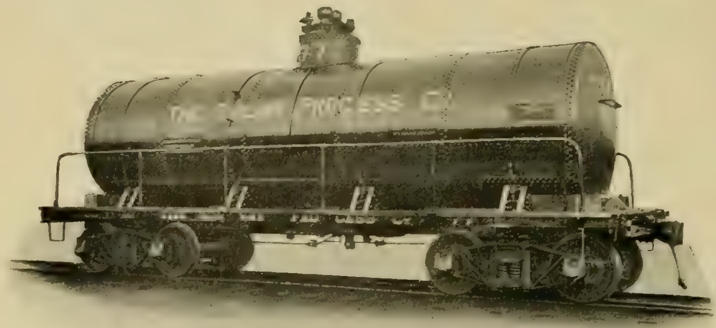

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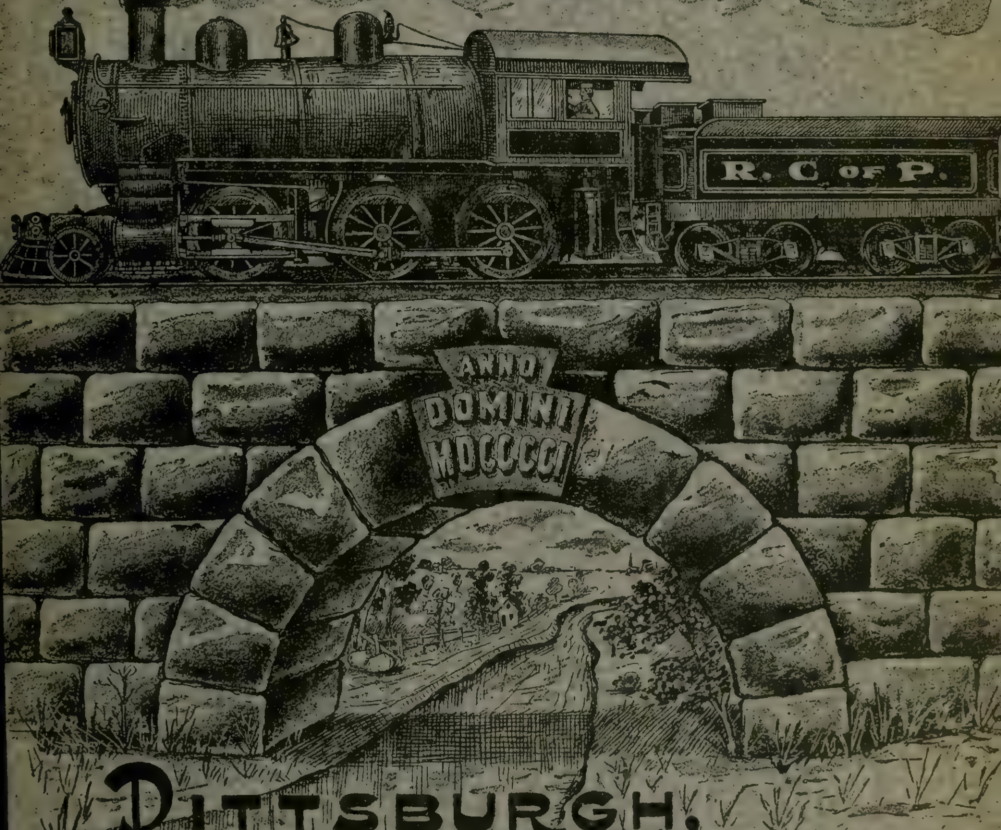

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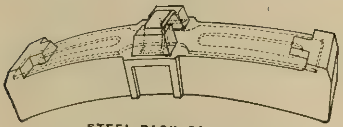

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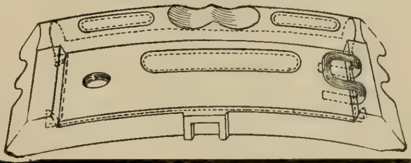

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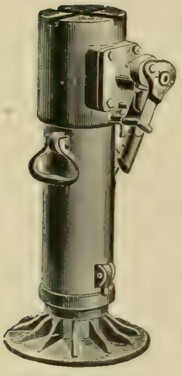

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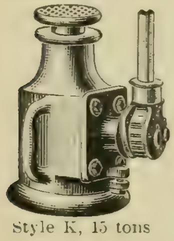

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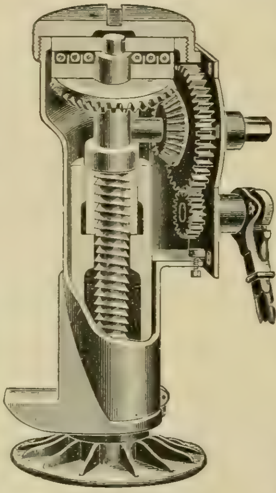

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J. D. Conway, Secretary, General Offices P. & L. E. R. R., Pittsburgh, Pa.

Meetings held fourth Friday each month, except June, July and August.

PROCEEDINGS OF MEETING,
APRIL 28th, 1905.

The meeting was called to order at 8 o'clock, P. M. at the Monongahela House, Pittsburgh, Pa., with President L. H. Turner in the chair.

The following gentlemen registered:

MEMBERS:

Allen, James P.
Barnsley, Geo. T.
Bell, W. K.
Blest, M. C.
Brown, Benson E.
Brown, E. W.
Caldwell, Jos.
Coates, H. T. Jr.
Conway, J. D.
Cox, H. A.
Decker, O. S.
Ditchfield, F.
Gies, Geo. E.
Gulick, H. Jr.
Haring, Ellsworth.
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Henderson, J. W.
Hood, D. G.
Howe, D. M.
Kessler, D. D.
Kinter, D. H.
Knight, E. A.
Malloy, M. A.
Michel, Wm. J.
McCartney, J. L.
McCaslin, A. W.
McFeatters, F. R.
McIlwain, J. D.
Oates, Geo. M.
Peach, W. M.
Porter, H. V.
Quest, W. O.
Redding, D. J.
Redus, Avery E.
Richardson, W. P.
Scheck, H. G.
Schomberg, Wm. T.
Shaw, O. M.
Smith, D. W.
Stafford, B. E. D.
Stucki, A.
Sweeley, G. P.
Taylor, H. G.
Thomas, Richard L.
Turner, L. H.
Wilson, W. J.

VISITORS:

Allen, W. S.
Alleman, C. W.
Andrews, Guy L.
Bentor, W. H.
Cherry, Chas. P.
Hurd, Arthur B.
Jackson, C. A.
Knickerbocker A. C.
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Ross, Phillip.
Shaw, W. F.
Smith, Jno.
Smith, M. A.
Smith, Sion B.

PRESIDENT: We will pass the reading of the minutes, as they are in the hands of the printer.

And as Mr. Stafford, who is to read the paper, must leave town at 10 o'clock, we will depart from our usual custom and have the paper before the business meeting. I am not sure whether Mr. Stafford thinks it not safe to remain in the city after reading the paper or not.

We will now have the pleasure of listening to Mr. B. E. D. Stafford, general manager of the Flannery Bolt Company, on "Locomotive Water Space Stays."

LOCOMOTIVE WATER SPACE STAYS.

By B. E. D. Stafford;
General Manager, Flannery Bolt Co.

The locomotive fire-box of to-day—as it is stayed in the water space—differs but slightly from its prototypes of 30 years ago, notwithstanding that the heating surfaces have been greatly extended and furnace areas enlarged to provide adequate heating capacity, in the effort to effect a greater distribution of steam and maintain higher working pressures, so essential to the requirements of modern locomotive practice.

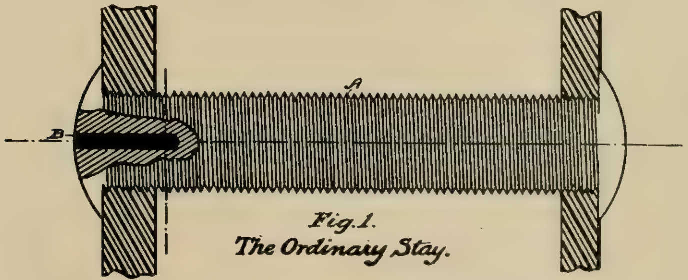
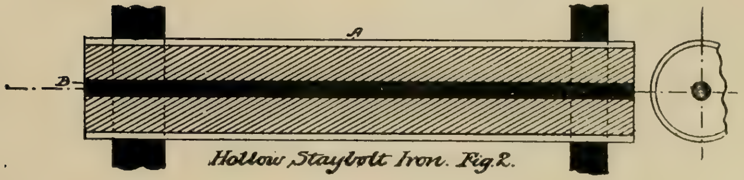


Fig.1.
The Ordinary Stay.



Hollow Staybolt Iron. Fig.2.

The ordinary water space stay—known as the rigid staybolt—as shown in Fig. 1, connecting the outer and inner sheets of the fire-box end of a locomotive boiler, is simply a piece of wrought iron, A, threaded its entire length, screwed through the outer sheet and plate, across the water space and into the inner plate or fire-box sheet, and riveted over on both ends, securely holding in a rigid manner the outer shell to the fire-box. In later years the tell-tale hole, B, was thought advisable, and such has been drilled in the outer ends of all staybolts of this type, to a depth of 1¼ inches, with a 3-16″ drill, passing beyond the thickness of the outer plate, enabling inspectors to detect rupture or breakage by the emisson of water or escape of steam through the orifice, where the structure of the iron has become separated and gives way close to the inner surface of the outer sheet.

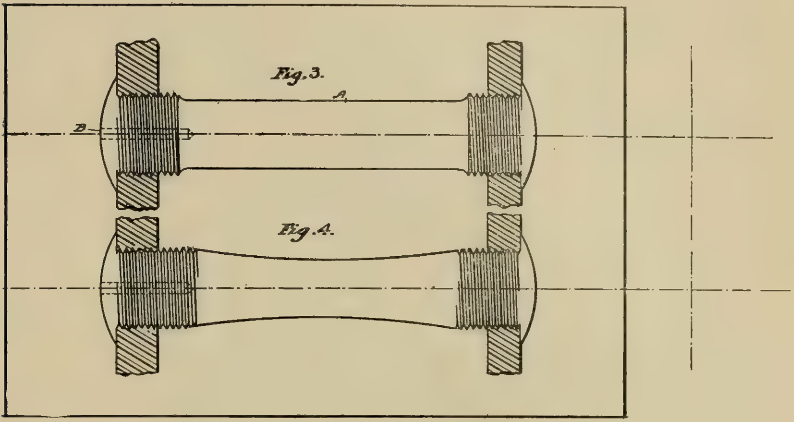
Fig. 2 represents a staybolt similar to Fig. 1, the iron of which has a structure so made as to provide a hole through the entire length of the bar, and known as hollow staybolt iron.

In bad water sections of the country where the lime and magnesia are found in solution, incrustation forms on the outer surface of the staybolt and at times covers a fracture, fills the tell-tale hole during the first stage of rupture and prevents the escape of steam or water, regardless of breakage. In sections where the water is free from solids this tell-tale hole is most advantageous and has been recognized by State and Government supervisors of inspection as a necessary process to the proper inspection of staybolts, who have authorized its incorporation on grounds of safety.

In arranging the pitch and diameter of the water space stay, the strength of the sheets or plates are not taken into consideration, the common practice being to make the stays strong enough to sustain the total load due to pressure and allow for the required margin of safety. The diameter of the stays vary from ⅞″ to 1″ when new, and are pitched equally over the entire surface of the fire sheet, generally from 3¾″ to 4″ from center to center of staybolt, each bolt exposed to a strain equal to the square of the pitch multiplied by the working pressure in pounds per square inch.

The safe stress allowed on the cross section of a water space stay by the United States rule is 6,000 pounds per square inch, irrespective of the difference in stress between the short and long stays.

The tensile stress in a water space stay is the load applied due to the working pressure on the surface of the plates, and so far is the only factor taken into consideration in connection with the ordinary or rigid staybolt, as shown in Fig. 1, yet in addition to the tensile stress due to pressure on the plates within the water and steam space, these stays are subjected to strains from the unequal expansion of outer and inner sheets.



To overcome staybolt breakages certain modifications of the original stay have been made, as shown in Figs. 3 and 4, that of simply turning off the threads in the center of the bolt exposed in the water space, followed by a greater reduction of diameter, as shown in Fig. 4, for the purpose of giving flexibility to the bolt to more readily withstand the reversal strain due to expansion.

While it has been found that the reduction of the diameter in the water space has not been of any material benefit to the life of the staybolt, it has the preference over the full threaded bolt to the extent that deposits, carbonates and sulphates of lime and magnesia, which precipitate from the waters used, do not adhere so closely and do not impair the quality and strength of the iron to such a marked extent as when threaded.

Corrosion and incrustation in sections of the country where waters are impure not only have a deteriorating effect on the life of the stay, but in greater proportions affects the fire sheets and congests the water space, as is shown in the illustration in Fig. 4a. A deposit of scale on the fire sheet on the water side interferes greatly with transmission of heat to the water and its resistance as a non-conductor is proportional to its thickness. Much has been written regarding the effect of scale on the fire-box surface and stays of locomotive boilers, and surely a remedy which would eliminate this condition without interfering with the natural process of generating steam, overcoming the introduction of chemical constituents into the boiler, which are liable to cause chemical reaction, which is detrimental to the strength of sheets through corrosion, would be regarded most valuable and vital to the economic service of both locomotive boiler and fire-box.

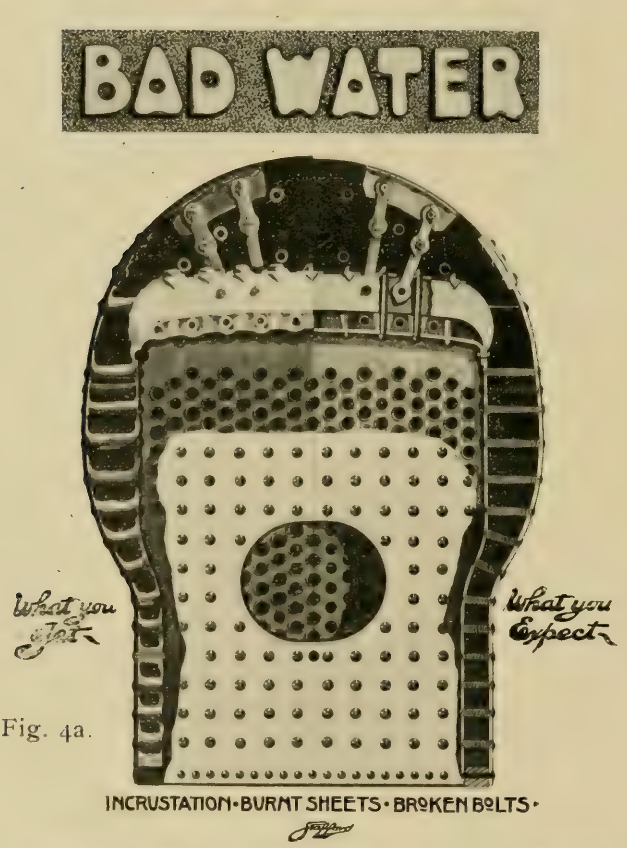

BAD WATER
What you get
What you Expect
INCRUSTATION • BURNT SHEETS • BROKEN BOLTS •

Fig. 4a.

In the use of the rigid water space stay—the ordinary staybolt—quality of material plays a most vital part in the life of the staybolt.

In determining the value of an iron for staybolt use in locomotive practice it is most essential that such material should be of that nature to withstand constant shock and vibration, high pressure and side strains, and of a character to maintain its general quality throughout service, to the highest limit of efficiency and safety.

The specifications of requirements ordinarily used, and based on the rulings of the tensile machine, call for the following claims:

A MINIMUM of 48,000 pounds per square inch, tensile strength.

A MINIMUM of 25% elongation on eight-inch sections.

That such shall be a double-refined iron, free from blisters and seams, rolled true to gauge, and taking a sharp thread. Fractures to be wholly fibrous. Samples to stand bending double, cold and hammered down without flaw.

The later specifiications stipulate that the iron shall meet a given number of vibrations, and so judged by the rulings of the vibratory machine. This was advisable, in as much as the reversal strain thrown on a water space stay was being recognized as a most destructive force.

Irons falling below the requirements, especially as to its tensile strength, were rejected, and the rejected product was oftimes higher in units of ductile tensile strength than the iron which was accepted by the rulings of the specifications. Merchantable bar iron would quite frequently meet the full requirements, and irons a little above the "common bar" quality met them largely.

It was then decided to stipulate in the body of the specifications that irons having a tensile strength between 47,000 and 48,000 pounds per square inch must show an elongation of not less than 30% in eight inches; between 48,000 and 49,000 pounds per square inch, 29%; over 49,000 pounds per square inch, 28%; all tests to be pulled at the rate of one-half inch per minute.

All iron makers know that the easiest thing in the world to do is to make an iron which will meet the requirements of the specifications based on the rulings of the tensile and testing machine, and in view of this fact the railway testing departments should not be misled in their efforts to arrive at the true value of a staybolt iron by overlooking the service or fire-box test and the physical construction tests throughout the shop practice.

The instant staybolt irons are heated to the degree of fire-box temperatures, all characteristics change, and all valuations based on a cold test are naturally questioned as serviceable values.

Much can be said on this subject, yet it was not the purpose of the author to more than touch on the issue of staybolt iron, other than to point to the real and not to the superficial values in dealing with the staybolt subject in general.

Staybolt breakages occur in large numbers in sections of the country where bad water exists, and during a period of four years, at which time the fire sheets are renewed, and in some instances less than three years, the staybolt breakage ranges from 30% to 60% of the horizontal installation of water space stays. In good water sections the breakage ranges from 10% to 20% in four years, and 30% to 50% in six years.

The cause of staybolts breaking more rapidly and to a greater extent in the bad water section is due to the congested condition of water space and to the incrustation which adheres to the water side of the fire sheet, necessitating higher temperature on the fire side to transmit sufficient heat units to maintain steam temperatures for the working pressure.

Four years ago, when in the bad water section, the author run across a lot of engines whose fire sheets were being removed on account of buckling and cracking, showing a permanent set. After closely observing the stays, which were very rigid and showing no signs of deflection, it was found that the iron was of a close, short fibrous structure, dense and hard, proof as to high tensile strength, and the thought occurred that the fire sheets were held too rigid to allow for expansion without bending, and finally cracking. These sheets had not been in service for more than 18 months, and it was decided after discussion to apply new bolts of a material somewhat softer, of long fibrous structure, with a tensile strength of 48,000 and about 32% elongation, a good serviceable staybolt iron, and see if the new sheet of the same material would buckle in like manner. This was done, and two and a half years later the sheets were as straight as could be expected, considering the hard water condition, showing no permanent set nor indication of cracks, although a few broken stays had been renewed.

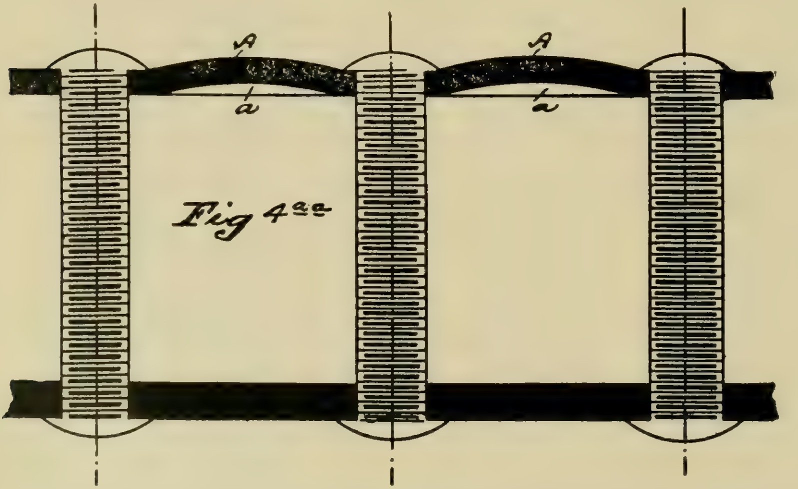


Fig. 4aa illustrates the buckling of sheets held rigid by the ordinary water space stay. Various articles have been written on the cause of fire sheets bulging, buckling and cracking, yet none have pointed directly to the cause, or even dealt with the rigid staybolt as strong as conditions would justify, in seeking to solve the question.

The primary cost of the ordinary staybolt is simply based on charges which in the aggregate covers the following items, the amount which should be charged direct to the cost during the process of mechanical operation:

Handling and hauling the iron to the shears.
Handling and cutting bars to bolt lengths.
Handling and squaring bolt ends.
Handling and threading bolts.
Handling and hauling to fire-box.
Handling and screwing bolts into fire-box sheets.
Cutting off bolts to rivet the ends.
Riveting bolt ends and holding on.
Drilling tell-tale holes.

With the above items taken into consideration, and the labor charges affixed, graded according to the quality of workmanship required, we can readily arrive at the first cost of a water space stay, considering first-class staybolt iron, bars running about fifteen feet long, taking the average length of staybolt as seven inches, estimating 25 bolts to the bar, or 40 bars to the thousand bolts.

On the above basis of calculation, covering the general range of prices and methods of shop practice, the cost per staybolt is from fifteen to thirty-five cents, so that we may conservatively say that a regular water space stay or what we will now term the rigid staybolt for water space connection, costs on an average of twenty-five cents per bolt, installed.

The cost of renewing broken staybolts of the rigid type ranges from $1.00 to $1.50 per bolt during the life of the fire sheet. We will take as an average $1.25 per bolt.

In arriving at the cost of renewals; which really means the cost of staybolt maintenance throughout the service life of a fire sheet, the following items should be considered and charges made accordingly:

Cost of drawing fire. Running in shop. Blowing out steam and draining boiler.
Cost of removing jackets and replacing.
Cost of removing air pump and replacing.
Cost of removing asbestos and replacing.
Cost of removing reverse lever and replacing.
Cost of removing pads, 8 to 15 nuts, and replacing.
Cost of removing injector and replacing.
Cost of dropping wheels and replacing.
Cost of removing cab, running board, etc., and replacing.
Cost of removing frame and replacing.
Cost of new staybolt, material and labor.
Cost of taking out broken bolt and inserting new bolt.
Cost of handling tools necessary to the operation.

Cost of refilling boiler with water.
Cost of firing up engine.
Cost of watching and inspecting.
Cost of coal necessary to get steam up to pressure.
Cost of running engine out of shop.

While we are not unmindful of the fact that other repairs are being made while an engine is in the shop for staybolt renewals, and staybolt renewals are at times made when other repairs are necessary to the withdrawal of the engine from service, if the actual charges were at all times made and placed to staybolt breakage account, we would no doubt be amazed at the cost of staybolt maintenance. Much of the information gotten by the author relative to the cost of staybolt renewals has been so absurdly low that it could not be considered at all; no doubt the charges which should have applied to the operation of renewals were charged to repairs.

During the life of the fire sheets the staybolt breakage covers an area known as the "breaking zone," which, we may infer, is the rigid section of the fire-box, where expansive forces are continually at work, covering the horizontal rows of staybolts below the crown sheet line, six to eight in number, spreading diagonally across the corners and running downward in the first two or three rows next to back head, flue and throat sheet, as shown in Fig. 17 and 17a, this applying to the side sheets and back end, while in the throat sheet the entire surface is affected.

To enable us to readily judge of the cost of maintaining staybolts the following table is given, radials or crown bolts not considered:

Total staybolt breakage in four years and cost of maintenance.

Percentage broken	10%	20%	25%	30%	40%	50%
Bolts broken . . .	80	160	200	240	320	400
Cost of renewing broken bolts @ $1.25 per bolt,	$100	$200	$250	$300	$400	$500
First cost of installation 800 bolts @ 25 cents,	$200	$200	$200	$200	$200	$200
Total cost in 4 years	$300	$400	$450	$500	$600	$700

Horizontal installation of water space stays=800

From the above table we will select a 20% and 40% breakage, covering four years. The first cost and cost of renewals is as follows:

20% breakage=$400, or 50 cts. a bolt. Entire installation.
40% " = 600, or 75 " " " "

If we should estimate the cost of engine out of service for the purpose of renewing broken stays at the rate of one day lost for every ten bolts renewed, and charge for this time at the rate of ten dollars a day, we would have an additional charge, which would greatly affect the value of the locomotive as an earning factor.

20% breakage, Cost of engine time lost=$.60
40% " " " " " =$320

Irrespective of the engine time lost, we will take the first cost of a water space stay and the cost of renewals as a basis for further consideration.

The rigid water space stay, the one ordinarily used, not only resists the pulling load or tensile stress, due to high pressure, but in greater proportion, has to withstand the vibratory or transverse stress thrown upon it, due to the expansive force exerted on the fire-box sheet.

The tensile stresses as ordinarily calculated are as follows, considering a stay 1″ diameter, at bottom of thread 0.892″ diameter.

The area of this diameter=0 625″; spaced four inches from center to center, made of wrought iron, 50,000 pounds tensile strength.

Boiler pressure	160	170	180	190	200	210	220
Force to be resisted in lbs. by each bolt as spaced.	2560	2720	2780	3040	3200	3360	3520
Tensile stress on each bolt in lbs. per square inch.	4096	4352	4608	4864	5120	5376	5632
Factor of safety	12.2	11.4	10.8	10.2	9,7	9.4	8.8

If the tensile stress were the only factor to be considered, we would be assured of a large factor of safety, as the above results show, applying to the ordinary water space stay as it is now calculated. When fire-box sheets are heated to high temperatures the expansion of such is excessive, and when rigidly stayed the transversal stress applied to the rigid stay is enormous in consequence of the expansive force exerted. Sheets buckle and bend in their effort to expand and rigid stays fail to withstand the strain thrown upon them.

This expansive force, known as the transverse stress, has been overlooked in the calculations which were deemed necessary toward arriving at a factor of safety which could be warranted as safe.

As the factor of safety is the proportion of strength which a structure possesses in excess of the load or strain to which it is subjected, no force which would tend to rupture a staybolt should be overlooked in calculating for safe conclusion; otherwise there exists a false sense of security, which leads to continual staybolt breakage and rupture of all materials involved.

at times terminating disastrously, through the consequence of improper staying by certain forces being ignored.

The transverse stress on a one-inch bolt whose diameter at bottom of threads is .892" is figured as follows, by the principal of bending moments. We will assume the load at the end of the stay is equal to the pressure multiplied by the length of the bolt, the pressure being 200 pounds and the length 4". The bending moment=M=200x4=800 inch pounds.

The resisting moment for a solid cylinder is R. = $\frac{A\,D}{8}$ in which A=area, D, diameter. For the one inch bolt, 12 threads, R= $\frac{.628 \times .892}{8} = .07 \frac{\text{inch}}{\text{pounds}}$ and by the equation $\frac{M}{R}$ the stress at the outermost fibers of a water space stay is :

$S = \frac{M}{R} = \frac{800}{.07} =$ 11428 lbs. per sq in. due to vibratory action of Fire box.

This transverse stress added to the tensile stress, as both stresses tend to rupture the bolt, is 5120+11428=16548 pounds per square inch. The total stress is entirely too high when constantly reversed for a rigid stay to withstand.

There is only one unknown quantity in the factor used, namely the assumed load of 200 lbs., acting on the Fire-box side. The theoretical deflection of that load = $D = \frac{wl^3}{3ei} = .0047$ inch. When W = the load on the the bolt, in this case assumed as 200,

l^3 = length of bolt cubed,

E = Co-efficient of elasticity which is taken at 30,000,000 lbs. for wrought iron.

I = Moment of Inertia of the section which is given as .049 of the diameter to the fourth power.

The fibre stress according to the above arrangement, is :

$S = \frac{3 \times D \times E \times C}{L^2} = \frac{3 \times .0047 \times 30000000 \times .4459}{4^2} = \frac{188615.7}{16} =$ 11788 lbs. per sq. inch.

In this equation D = deflection.

E = Co-efficient of elasticity.

C = Distance of outermost fibres from the neutral axis or center of bolt.

L = Length of bolt squared.

The fibre stress of 11,788 pounds per square inch as found above closely agrees with the 11,428 pounds per square inch found in the first method.

Taking 11428 lbs. per sq. in. as the Transverse stress
and 5120 " " " " Tensile stress
as both forces operate to break the rigid water space stay, the total effect in the direction of rupture would be 5120 + 11428 = 16548 lbs. per sq. in., a stress too high for a rigid bolt to withstand regardless of material used considering that the stress is constantly reversed.

Thus giving a Factor of Safety of 3 only.

In the absence of any data to show what the magnitude of the expansive forces are, which are at work in the fire-box, it is necessary to assume either the load or the deflection of the bolt.

The deflection for the load 200 pounds was shown to be .0047 inch by calculation. If the actual deflection is known, and this should by all means be found out, not by theory, but by actual tests with instruments applied to the fire-box sheets, then the fibre stress can be found at once by the equation.

$$S = \frac{3 \times D \times E \times C}{L^2}$$

Suppose, for instance, the real deflection was ⅛″, or .125, the fibre stress on a one inch staybolt would be 313,523 pounds per square inch.

What does this point to but the fact that sheets buckle and bend in their effort to expand, and that the fire-box is too rigidly stayed to warrant safe conclusions.

Rigid water space stays are inadequate to the test. Flexibility must be maintained in a water space stay, and the most practical means of providing for such is a *flexible staybolt.*

Several types of flexible stays have been tried in railway service, as shown in Figs. 6, 6a, 7, 8, 9, and 14. Several other designs have been invented on the principal of the chain or link and wire rope, but the author simply shows the styles found in use, covering a period of eight years, and the sketches were made by careful measurement and reduced from sample bolts, or bolts found in service, with the exception of Fig. 14, which was taken from an electrotype illustration.

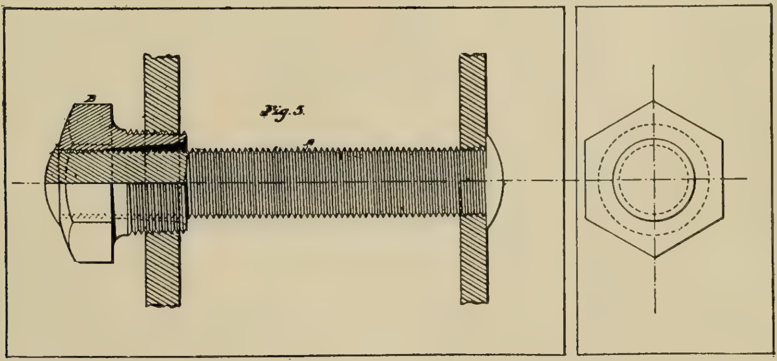


Fig. 5 is not a flexible bolt, it is simply a sleeve screwed into the outer sheet of boiler, allowing extra length for the ordinary stay. The sleeve is of malleable iron.

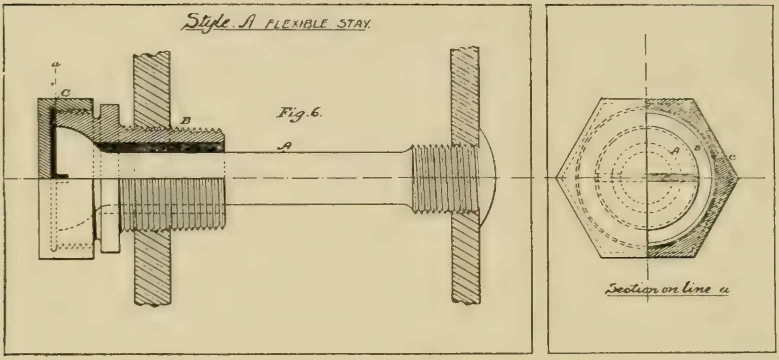


Fig. 6 shows style A, flexible stay, the head being quite flat and having but little area where such is needed.

This bolt has been used by several of the railroads and was one of the early designs to afford flexibility in a water space stay.

The black lines surrounding the head and shank of bolt (A) showing clearance in cap C, and sleeve B, will give a clear idea as to how incrustation might affect the ease of movement of this bolt. The sleeve and cap are made of brass by some roads, and malleable iron by others.

Malleable iron is too porous to be of any serviceable value in any style of a flexible bolt.

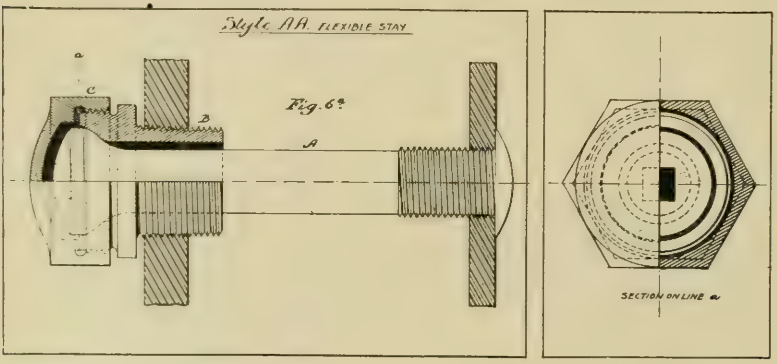
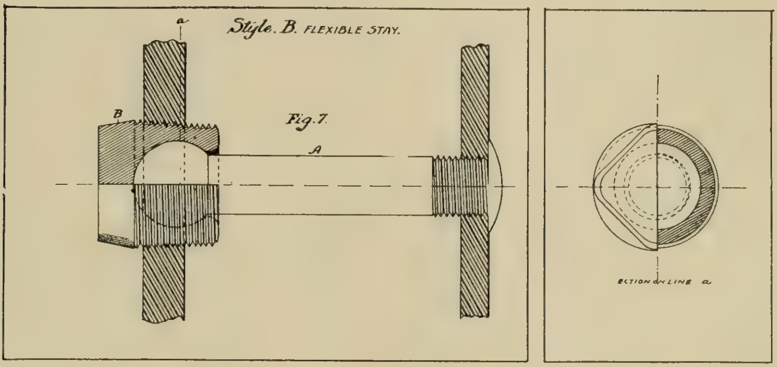


Fig. 6a is a modification of Fig. 6, more practical and serviceable in its lines of design to maintain the flexibility. Cap and sleeve are made of steel.

Fig. 7 shows a style of flexible stay; the plug, B is of steel drop forged over the head of bolt A, and sleeve and bolt are screwed into outer and inner sheet simultaneously.



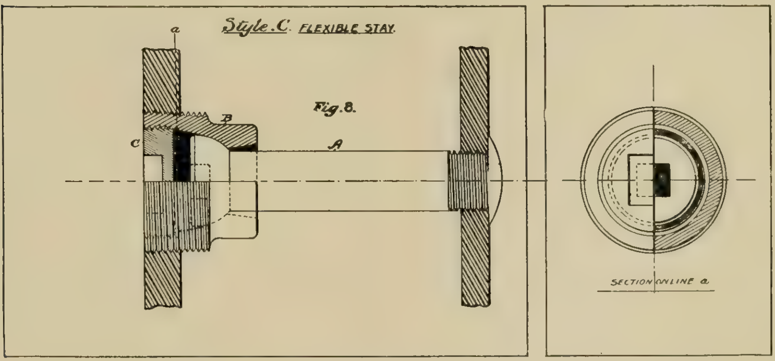


Fig. 8 shows a style of flexible stay where the sleeve (B) is screwed flush with the surface of the outer sheet, the bolt inserted into inner sheet and plug (C) screwed into sleeve (B) to effect a steam tight joint. Plug and sleeve are made of steel. Have found in some cases the plug made of brass.

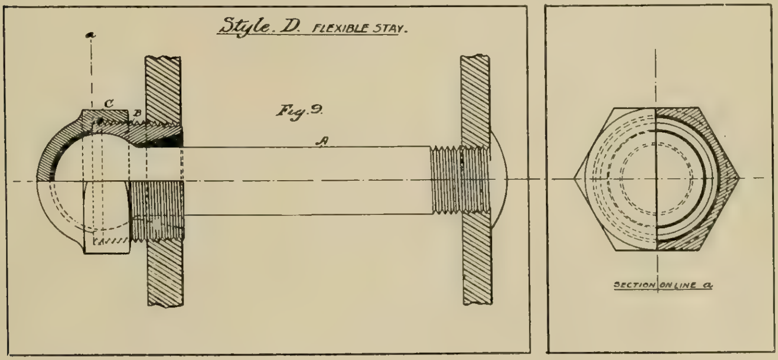


Fig. 9 is a style of flexible stay of the round head design, taking several sleeves, as shown in Fig. 10, for the different thicknesses of plates, and in Fig. 12 is illustrated the assemblage of bolts applying to this flexible stay, to be used in one sleeve.

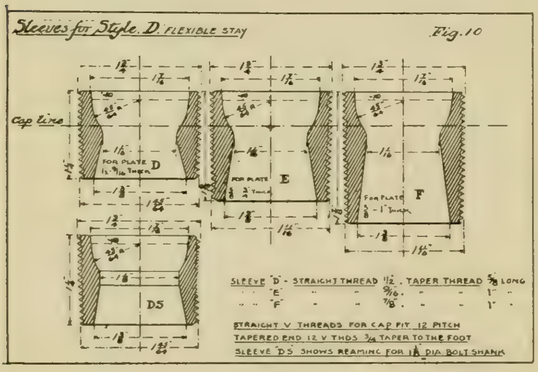

Sleeves for Style. D. FLEXIBLE STAY

Fig. 10

Cap Line
D
FOR PLATE 1/2–9/16 THICK
E
FOR PLATE
F
FOR PLATE 5/8–1" THICK
DS
SLEEVE "D" - STRAIGHT THREAD 1/2". TAPER THREAD 5/8" LONG
" " "E" " " 9/16". " " 1" "
" " "F" " " 7/8". " " 1" "
STRAIGHT V THREADS FOR CAP FIT 12 PITCH
TAPERED END 12 V THDS 3/4 TAPER TO THE FOOT
SLEEVE "DS" SHOWS REAMING FOR 1 1/8" DIA BOLT SHANK

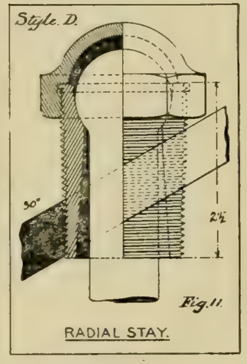

Style. D.

Fig. 11

RADIAL STAY.

Fig. 11 shows the same flexible stay used as a radial, with long sleeve.

Cap is of drop forged steel and sleeve of cold rolled steel.

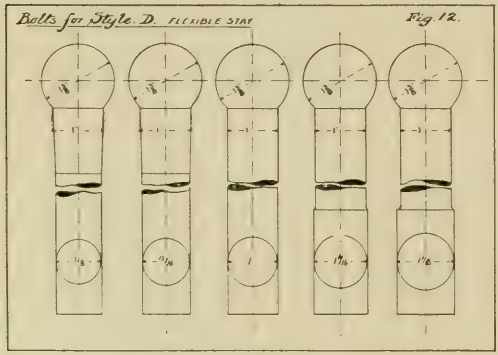

Bolts for Style. D. FLEXIBLE STAY

Fig. 12.

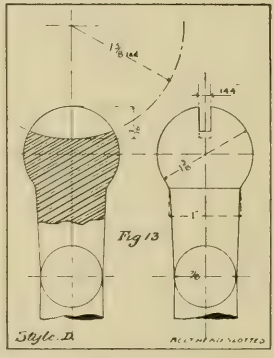


Fig. 13

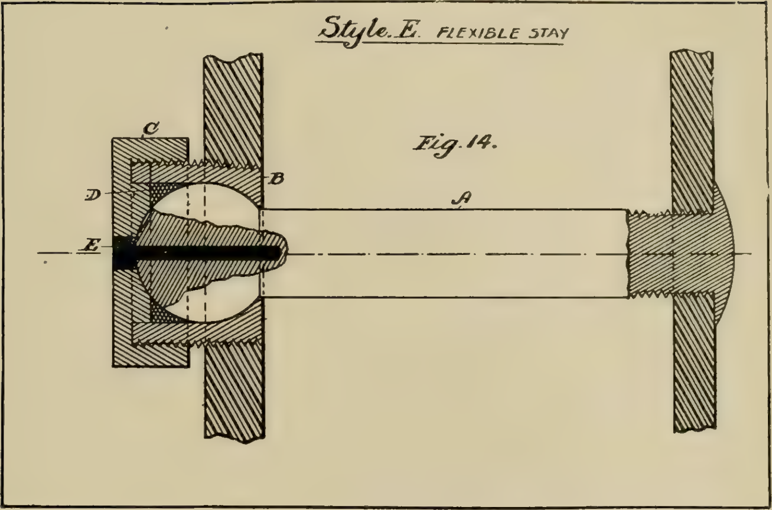
Style. D.

Fig. 13 shows the bolt used for this style stay, slotted.

Fig. 14 is a style of flexible stay of the round head type, which has a metallic packing (D), closely fitting the head of the bolt, and tell-tale hole (E) in cap and bolt for detecting breakage.

Flexible stays can only prove their value in service test. The locomotive fire-box is no respector of persons; the design which is perfect to withstand the stresses and disintegrating influence of road service and maintain flexibility will only be discovered and judged accordingly from that standpoint.

It is of the most vital importance to the success of the



flexible water space stay that good work be always done in the installation of the complete bolt. There is no excuse for leakage when proper attention is given to methods of installation of a flexible stay, and in tapping the taper holes, which are made in the outer sheet to receive the sleeves, such should be carefully inspected and all plugs and sleeves screwed up to a steam tight fit, and all caps which make their seat on the end of sleeve should be screwed up tightly, using graphite in the threads, for by the unscrewing of the caps we are allowed to inspect the staybolt proper, when thought advisable.

Tools for installation are shown on tool sheet, also method of removing old rigid water space stays and enlarging the holes in outer sheet for flexible stays.

Referring to tool sheet, Fig. 1 is the method of removing the old bolt by using an enlarged twist drill, following the prick punched center of old bolt, drilling through outer sheet and using a reduced diameter of drill through inner sheet, collapsing the end (C), or separating such by a Wagstaff drill, leaving the hole in outer sheet enlarged ready for roughing reamer for the flexible staybolt sleeve.

Fig. 5 is a butt mill, which enlarges the hole in like manner, from tap drill size.

Fig. 2 is a roughing reamer (B), with guide bar (A), to be used in air drill to quickly straighten and size the hole in outer sheet.

Fig. 3 is a finishing reamer, with guide bar, for exactly sizing each hole previous to tapping.

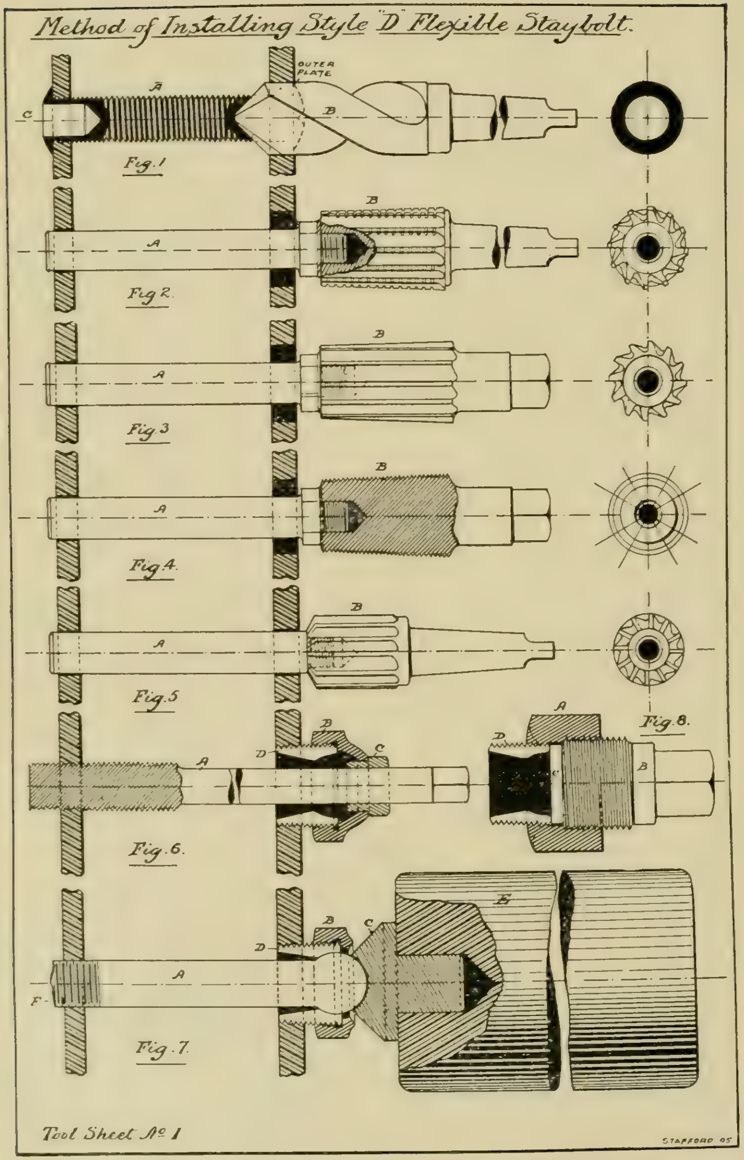


Fig. 4 is a taper tap with guide bar, $\frac{3}{4}$ inch taper to the foot, 12-V threads, for finish tapping the hole in outer sheet to receive the sleeve.

Taper tapping differs from straight tapping. The reamed hole should always be of exact size for the tap to give good full threads. The tap should not be used to enlarge the hole, for this process is both unmechanical and detrimental to the tap.

A straight tap of the right diameter used before the taper tap, facilitates the tapping operation and relieves the taper tap from great strain and clogging.

Fig. 6 shows the method of tapping inner sheet with regular staybolt tap to allign with the installed sleeve. A cap (B) of the style (D) flexible stay is used as a means for holding the bushing (C). which holds the shank of the tap in line.

The sleeve is screwed into the outer sheet by the stud nut shown in Fig. 8, and as it takes nearly two turns to make a steam-tight fit, after the sleeve just fills the tap hole, it is necessary that the tapping operation should be gauged accordingly.

Fig. 7 shows the style (D) bolt installed ready for riveting over the end (F). B is a cap such as is used for the flexible stay, cut away for the admission of dolly bar, bucking tool or holder-on. This cap protects the sleeve face where cap makes a steam-tight joint during the riveting operation.

The dolly bar or holder-on is made of a piece of axle, 4 or 5 inches in diameter. C is a tool steel plug inserted therein, hardened and tempered.

The style D. bolt as shown in Fig. 9 is installed with Alligator wrench on the fire-box end, or by slot in the head.

The method of installing the flexible stays style A, AA, can be readily understood. The bolts have slots or squares in their heads and sleeves have hexagon collars, a part of the section.

Wrenches for installing Style C sleeve & bolt

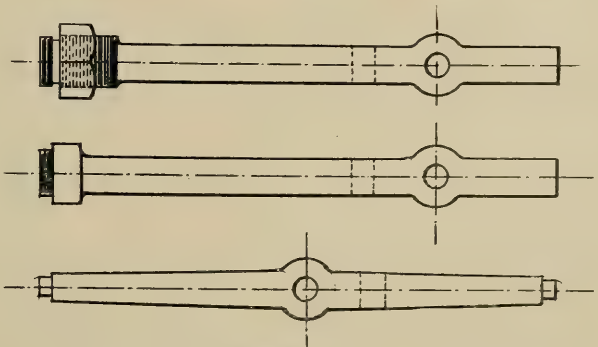


Fig. 15.

Fig. 15 shows wrenches for installing style C flexible stay, sleeve, plug and bolt, as shown in Fig. 8.

Fig. 16.

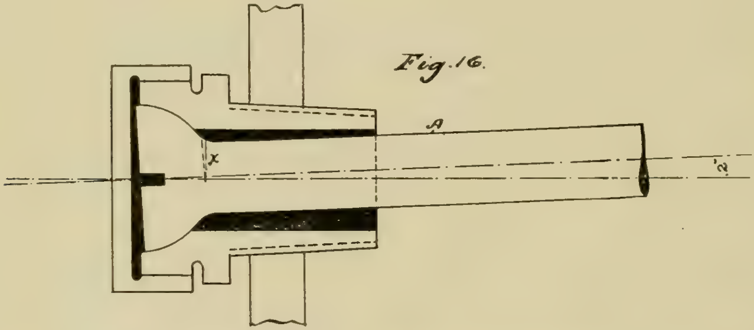
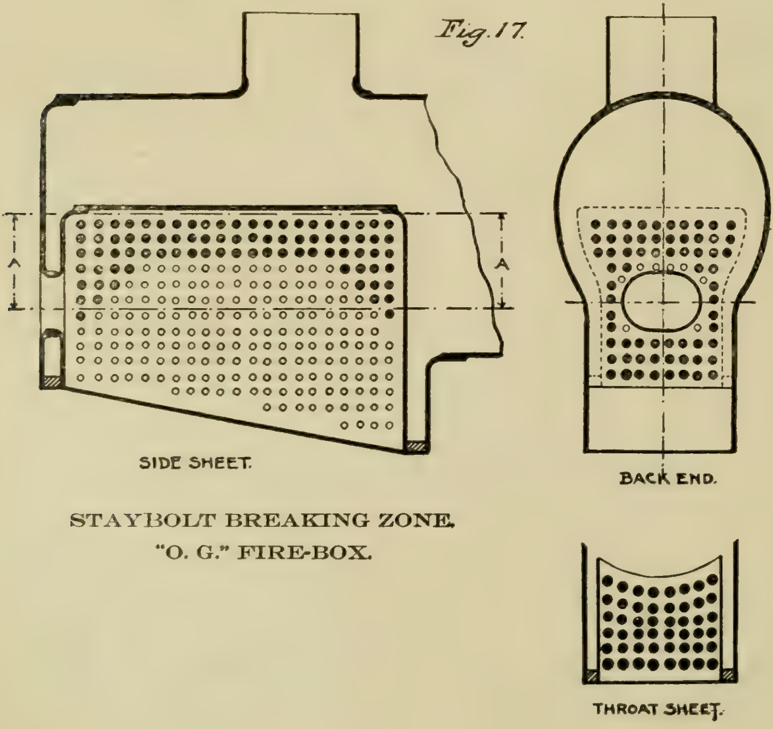


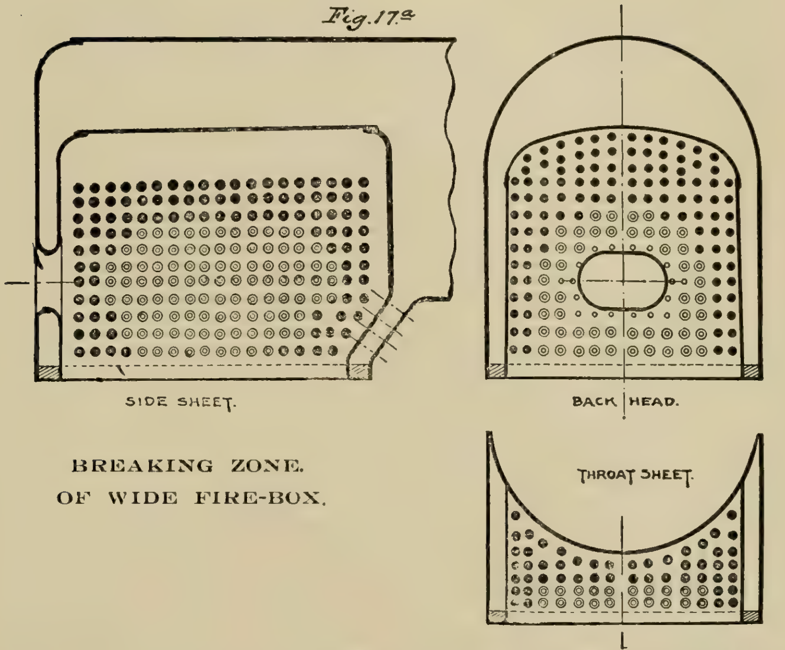
Fig. 16 shows a style A flexible stay with the bolt in a position two-tenths of an inch from its central or natural position, and demonstrates what effect incrustation might have should it become solid and lock the head of the bolt. Fracture of the bolt head would occur at X.

Fig. 17.



STAYBOLT BREAKING ZONE.
"O. G." FIRE-BOX.

Fig. 17a



BREAKING ZONE.
OF WIDE FIRE-BOX.

Figs. 17 and 17a represent the breaking zone of both the narrow and wide fire-boxes, such being taken from staybolt-breaking diagrams. This clearly illustrates the installation which is necessary for the flexible water space stay. The area covered by lines (A) in Fig. 17 is at times filled with flexible stay bolts, in fact 600 flexible stays in this style of fire-box have been installed out of a possible 800. For the wide fire-box installations run from 300 to 800 of the flexible stay, while in many instances for both styles of fire-boxes smaller installations have been made.

Flexible staybolts should not be installed alternately, which has been done in some cases, for it is but a short time before the rigid water space stay has to be taken out and the flexible stay incorporated to effect a sensible installation.

There is no rule to apply regarding the selection of the installation for flexible water space stays other than to cover completely the natural breaking zone of each style fire-box.

A 33% installation is low enough to warrant economic results and allow for expansion of fire sheet. There is no doubt but that in a few years we will find complete installations of water space stays.

The cost of flexible stays range from 40c to 70c a piece, complete, with bolt.

The cost of installing the flexible water space stay with proper tool equipment and systematic methods should not exceed 25 cents per bolt, and when installed in large quantities the cost should be as low as 15 cents per bolt.

A perfect flexible stay, properly installed, covering 33% of the water space installation, should give a four years' service without additional expense. The cap and sleeve remain intact in the outer sheet and can be used when it is necessary to remove the bolt for fire sheet renewal.

Taking the cost of flexible stay at 45 cents, and cost of installing at 20 cents, total cost, 65 cents; and the first cost and cost of installing a rigid bolt, 25 cents, –let us compare the staybolt cost per engine during a period of four years.

One engine installed with the rigid stay, showing cost of maintaining with 40% breakage,—

Complete number of water space stays, 800

40% breakage equals 320 bolts renewed.

First cost and cost of installing = 800 @ 25 cents per bolt = $200
Cost of renewing 320 broken bolts @ $1.25 " " = 400
Cost of water space stays and maintenance = $600
Cost per bolt at end of four years = 75 cents a bolt.

One engine with flexible stays to the extent of 320 out of a possible 800, equal to a 40% breakage as shown in engine with complete installation of rigid stays.

First cost and cost of installing Flexible stays = 320 bolts @ 65 cents = $208
First cost and cost of installing Rigid stays = 480 bolts @ 25 cents = 120
Cost of 40% installation of Flexible stays and 60% rigid = 800 bolts @ 41 cents = $328

Remarks by the Author.—As we do not know what the breakage would be with an installation of 40% flexible stays in four years, the difference in the total costs, as given, covering this period, are shown for the purpose of exciting consideration and investigation, assuming that the staybolt breakage should be very small, if any, with a perfect flexible water space stay properly installed.

Regarding large holes in outer sheet.

Some Mechanics have expressed the opinion that by drilling larger holes in outer sheet for Flexible stays would weaken the sheet.

A Flexible staybolt resisting the load due to pressure, instead of weakening outside sheet, gives an added element of strength for the reason that it prevents pocketing or bulging of the sheets. The closer the sleeves are brought together, the less liability for bulging between bolt centers, as the stresses become concentrated in the sleeve and therefore relieve the sheets.

The pitch of a staybolt is decided by the thickness of sheet and boiler pressure. The thinner the sheet and the higher the pressure, the closer must be the spacing in order to prevent bulging or pocketing of the sheets between the bolts. The bolt must be made of such a diameter as will bring the fibre stress at or below 6000 pounds per square inch. With 200 lbs. pressure, the fibre stress on a one inch bolt spaced four inches from center to center, will be 4 x 4 x 200 = 3200 lbs., divided by 0.625 inch. = 5120 lbs. per sq. inch, which is safe for the bolt.

The four inch spacing of bolts is safe against pocketing at a thickness of sheet of ⅜ inch, and a boiler pressure as high as 250 pounds per square inch, for a regular rigid water space stay. If the holes in the outer plate are enlarged to 1 ¾ inch, there is larger reduction of area of sheet between the bolts, due to increase in diameter of the screwed portion or sleeve of a flexible staybolt, or in other words, there is less sheet exposed to pressure between the sleeves of two bolts than there is between two rigid stays having the same pitch.

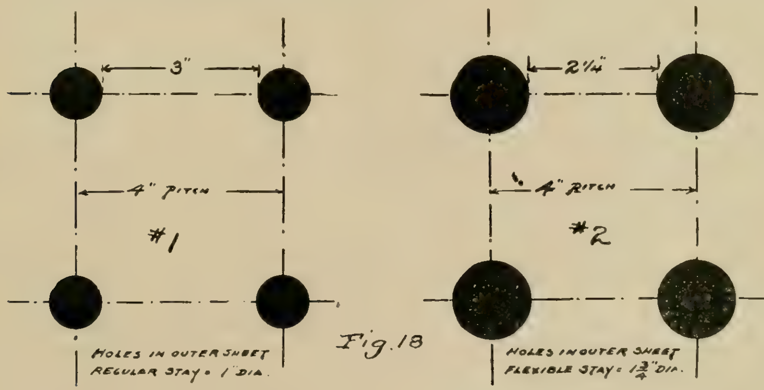


Fig. 18

By referring to the drawings, Fig. 18., No. 1 shows the actual space to be 3 inches from bolt to bolt. No. 2 shows the space to be 2 ¼ inches from outer edge to outer edge of sleeve—when spacing is equal—and the larger the sleeve diameter, the less will be the liability to pocket.

The sheet can fail only by shearing the threads on the bolt or in the hole of sheet, and this again is in favor of the larger diameter, since the shearing area of the thread on the one inch bolt is 0.899 x 3.1416 x .5 = 1.41 square inches, while the shearing area of the 1 ¾ inch sleeve is 1.649 x 3.1416 x .05 = 2.59 square inches, or nearly twice that of the rigid bolt.

The stresses which tend to rupture a staybolt are:—That which operates to tear the bolt apart, the tensile stress; that tendency to break it, transversely or cross wise, due to expansion of fire sheet, the transverse stress; and that due to shear which tends to strip the threads from the bolt and hole in the sheet.

During the forthcoming convention of the Railway Master Mechanics the flexible staybolt subject comes up for discussion, following the report of the investigating committee appointed to get data regarding the service of all styles of flexible stays, and it is to be hoped that no issue or part of the general subject will be overlooked in dealing with so important matter.

The fact that staybolt breakages have in no sense diminished, regardless of the quality of iron used and the many modifications of the forms devised in the rigid stay in the effort to provide flexibility, notwithstanding that water spaces have been widened, leads us to conclude that the fire-box as now constructed is too rigidly stayed to allow of economic and safe working where cost of maintenance of the complete machine is more or less affected in consequence of the expense accruing from the fire-box and staybolt charges of repairs incident to the constant disintegration and destruction of material, the result of shock, strain, vibration, corrosion and heat.

The force which works on the fire sheet in its course of expansion, due to high temperatures of furnace heat, throws a stress on the outermost fibres of the rigid staybolt far in excess of the tensile stress, and as it is a reversal or vibratory stress the effect on the structure of the staybolt iron is too severe to warrant safe conclusions as regards maintaining a reasonable factor of safety.

The transverse stress breaks the rigid staybolt, not the tensile stress, and to enable the expansive forces to take their natural course with least resistance the flexible staybolt has been designed as a water space stay, as the most perfect means of affording and maintaining flexibility under all conditions of fire-box service, adding to the life of both sheet and staybolt.

The art of Locomotive Fire-box design to meet the requirements of Modern Fire-box service, will advance in just that proportion as adequate provision is made to incorporate the most perfect mechanical means of maintaining flexibility in water space stays.

PRESIDENT: Gentlemen, you have just listened to as complete a paper on the comparison of flexible and rigid stay bolts as has ever been made, it seems to me, in this country. To my personal knowledge Mr. Stafford has been engaged in handling stay bolt iron and stay bolts for 12 years, and has given serious and intelligent attention to the attempt to work out this question. We have here a good many master mechanics, locomotive firemen and locomotive engineers interested in this subject, the most important one in the operation of high pressure locomotives. Mr. Stafford has half an hour yet before he must go, and I know he will willingly answer any questions you may desire to ask. Mr. Redding, can you open the discussion?

MR. D. J. REDDING: Mr. President and Gentlemen—Mr. Stafford has not left very much to be said on the question of stay bolts. I think, though, he has been too generous in estimating the cost of renewing broken stay bolts. He has probably based his figures on the total cost of renewing the bolts, added to the value of the lost time, based on the rental value of the locomotive. It very often happens that locomotives are out of service for stay bolt renewals at a time when their worth to the company cannot be measured by rental value; they might at such times be worth 10 times as much to the company as the rental value.

Without doubt the practice of fastening the fire box sheets together with rigid stay bolts in the breaking zone is incorrect in principle. There is no trouble at all in providing a rigid stav bolt with sufficient strength to carry the load that is placed upon it by the steam pressure; one-inch bolts spaced four inches apart in a boiler carrying 200 pounds steam pressure would have 10 times the necessary strength to carry the tensile load, but that is not what breaks the bolts. As Mr. Stafford has said, it is the tranverse strain, and no rigid stay bolt can be installed in the breaking zone of sufficient strength and at the same time sufficient elasticity to to take care of that transverse strain. Some writers on the subject have advocated placing the stay bolts closer together and making them smaller in diameter. One of them would put in $\frac{5}{8}$-inch stays spaced $2\frac{1}{2}$ inches apart. That might help a little, particularly if the water space was wide enough to use very long bolts, but with this spacing of bolts the water space would be so restricted and filled up with stay bolts that you could not get proper circulation, and circulation in fire box spaces is a very important consideration. Undoubtedly a great many of the cracked sheets are due to imperfect circulation. It seems to me that the only solution of the difficulty left is to put in a bolt which will go and come with the fire box sheets as they expand and contract. Complete installation of flexible bolts is not necessary, as the movement of the sheets in their central portion is very slight, increasing in direct proportion with the area of the sheet and being greatest at the outer edges.

I believe there has been a great deal of adverse criticism of flexible stay bolts in the past, which was due not to any incorrectness of the idea of flexibility, but to the fact that the bolt used had some spaces where the accumulation of scale would in time make it practically rigid.

Some of the bolts shown in the cuts to-night, with the flat heads, if used in scale producing water would become rigid and be no better than the ordinary rigid bolt. Where flexible bolts are used, having round heads, there should be no difficulty from scale, and the bolts should last as long as the fire box. The road with which I am connected has a few installations made with bolts of this kind, some having been in service for a year or more, and so far we cannot find that any scale has formed about the head, and while that may be partially due to the fact that we do not have quite as much scale to contend with as some other roads, we still have some, and if there is any scale at all in the water, or if it is to have any effect whatever, it should have made some slight showing after a year's service. As there has been no breakage of the flexible bolts and none of the rigid bolts, which are in the central part of the sheets, we believe that our stay bolt troubles will largely diminish as we extend the flexible stay bolt installation, which will be a result very much to be desired.

PRESIDENT: Mr. Stucki, can you give us any information as to the strain that is on these bolts, from an engineering standpoint?

MR. A STUCKI: Some years ago, while with one of the Eastern railroad companies, I had a good deal of experience with broken stay bolts, and in order to reduce the trouble the company finally decided to reduce the stay bolts in the center, since, as Mr. Stafford has pointed out, the tensile stresses are very small in comparison with the bending stresses. Besides this, the latter are alternative stresses and should for this reason be kept low. It is really a mathematical problem to strike a happy medium between the two diameters, and if the stay bolts are not entirely too short I know that the trouble can be overcome to a very large extent, especially since this method will take care of both the sheets.

The stoy bolts referred to are made in a special machine which, after having inserted a rod, will automatically turn, thread and cut off the bolt, likewise feed the rod until there is nothing left, so that this kind of a stay bolt is very inexpensive.

PRESIDENT: I don't know what a blacksmith should be supposed to know about locomotive boilers, but we have one with us to-night who can talk at any time on the subject of iron. We would like to hear from Mr. McCaslin.

MR. A. W. McCASLIN: Mr. President—I do not know that I can say anything on the subject of stay bolts that would benefit or even interest the members of the club.

I am of the opinion, however, that the introduction of the flexible stay bolt was a step in the right direction. We know that expansion and contraction, as well as vibration, cause friction of the particles of metals, and this is probably aggravated in rods or bolts that are held rigid at each end. Friction, in its turn, causes heat, and the result is crystallization, which completely nullifies the original strength of the metal.

The flexible stay bolt is intended to better accommodate itself to the laws governing expansion and contraction than the old style rigid bolt will. If this intention is realizable, and crystallization is lessened, much good will be accomplished.

PRESIDENT: Is there anything you would like to say in closing, Mr. Stafford?

MR. B. E. D. STAFFORD: One thing that should be impressed upon the minds of you, the mechanic, is the desirability—the absolute necessity of doing good work. A flexible stay bolt rightly installed in a locomotive should give no trouble provided the bolt is perfect in its design and construction. If it is not put in right it will give the same trouble as any other appliance improperly attached.

And furthermore, do not think because the bolt is of flexible design that any grade of iron will suffice. It is just as necessary to put in good iron in a flexible stay as it is for a rigid stay, because we are taking care of the stresses both tensile and transverse. And the best of material is none too good for the present day construction of locomotive fire box.

MR. D. M. HOWE: I was a little late in getting in, and possibly what I have to say will not be appropriate at this time, but I will try to make it so.

You, sir, Mr. President, have been presiding officer of this organization for nearly two years; your acts have been those of a gentleman and you have at all times delivered your rulings justly, honestly and impartially. But it happens that there are some of the members of this club who are a little sensitive at times, especially when you attempt to call the meeting to order. You invariably resort to your pocket for your lead pencil, or perhaps you use your fingers to thump the table to call the meeting to order. Now, sir, to avoid this it becomes my duty and pleasure to present to you a little gavel, that you might stop all this and preclude the possibility of irritating these gentlemen's nerves and doing yourself personal injury. Accept this little mallet with the compliments of the members of the Railway Club of Pittsburgh.

PRESIDENT: I thank you, Mr. Howe and gentlemen.

(Great applause, which was immediately rapped to order by the new gavel.)

SECRETARY: I thought when Mr. Howe got up and made a start at a speech that he was going to hand over some of those cheap Joseph Dixon Crucible Company pencils to our chairman. It turned out much better than I feared.

ON MOTION a vote of thanks was tendered Mr. Stafford for his very interesting paper.

The following list of proposals for membership were read by the secretary:

Mr. E. G. Beatty, representing Galena Signal Oil Co., Franklin, Pa.

Mr. George F. Freed, superintendent The Duff Manufacturing Co., No. 1120 Allegheny Ave., Allegheny, Pa.

Mr. D. Gallaudet, general foreman B. & O. R. R. shops, Glenwood, Pittsburgh, Pa.

Mr. Guy M. Gray, mechanical engineer, Bessemer & Lake Erie R. R., Greenville, Pa.

Mr. A. B. Hurd, checker, Pressed Steel Car Co., No. 32 Harrison Ave., Bellevue, Pa.

Mr. A. C. Knickerbocker, checker, Pressed Steel Car Co., No. 1418Locust St., Allegheny, Pa.

Mr. B. L. Tamkins, shop foreman, Pittsburgh Stoker and Manufacturing Co., No. 2700 California Ave., Allegheny, Pa.

Mr. David Watson, foreman, B. & O. R. R., Glenwood shops, Pittsburgh, Pa.

Mr. O. W. Young, secretary, Young-Mann-Averill Co., No. 1709 Railway Exchange Bldg., Chicago, Ill.

PRESIDENT: As soon as these names have been favorably passed upon by the executive committee the gentlemen will become members of this club.

The secretary read a communication from Vice President A. Kearney as follows:

Pittsburgh, April 20, 1905.

Railway Club, of Pittsburgh:

Gentlemen—On account of my new duties taking me away from your city it is with regret I have to resign the vice presidency of your club, a position and honor I assure you I have greatly appreciated. Very sincerely yours,

A. KEARNEY.

On motion the resignation is accepted with much regret.

MR. D. J. REDDING: I believe there is also another vacancy in the official board, one of the executive board having recently died. In view of the fact that we have but two meetings before the annual election, one before and one after vacation, I would move you that the positions of member of the executive committee and vice president be left vacant until the annual election.

The motion being duly seconded was carried.

PRESIDENT: I believe it is a good thing to do as it has been suggested that we ought to increase our executive committee so as to have a representative on it from every road in the city, and possibly from every road which is represented in the club membership. I think that would bring about a more general interest and would result in the consequent improvement of the club.

Since our last meeting death has removed one of the members of our executive committee, Mr. Charles L. Gist, superintendent of transportation of the Pittsburg & Lake Erie railroad. Mr. Gist had attained a very enviable reputation among car service men throughout the Middle States. He was admired for his manly and lovable qualities. I will appoint as a committee to draft suitable resolutions:

Mr. J. B. Yohe, general superintendent P. & L. E.

Mr. R. E. McCarty, general superintendent P. Co., southwest system.

Mr. Frank McCune, general superintendent Monongahela Connecting R. R.

Mr. A. M. Schoyer, general superintendent P. Co., northwest system.

We also have lost another member by death in the person of Mr. Mark McDaniel, master plumber, Pittsburg division P. R. R. Mr. McDaniel died very suddenly on April 8th. I will appoint as the committee to draft suitable resolutions,

Mr. M. A. Malloy, master mechanic P. R. R.

Mr. H. M. Meason, roundhouse foreman P. R. R.

Mr. F. M. McNulty, master mechanic Monongahela Connecting R. R.

Adjourned.

Charles Lincoln Gist.

Whereas, the great Architect of the Universe, in His All-Wise Providence, has suddenly removed from among us our esteemed companion,

CHARLES LINCOLN GIST;

and

Whereas, Mr. Gist was a charter member of the Railway Club of Pittsburgh and a member of its Executive Committee; therefore be it

Resolved; That by his removal the Railway Club of Pittsburgh has lost one of its most active members, one who was broad in thought, wise in counsel, firm in purpose, tender in heart, and feeling and be it further

Resolved; That the Railway Club of Pittsburgh tender to his bereaved wife the heart-felt sympathy of its members; and be it further

Resolved; That these resolutions be spread upon the minutes of this Club and a copy of the same be sent to Mrs. Gist.

J. B. Yohe,
A. M. Schoyer,
R. E. McCarty,
Frank McCune.
} Committee.

Mark McDaniel.

Our Almighty Father, in his infinite wisdom, has removed from among us our fellow member of the Railway Club of Pittsburgh,

MR. MARK McDANIEL,

who died suddenly at his home, Pittsburgh, Pa., April 8th, 1905. Therefore, be it,

Resolved: That in his death, not only the Railway Club of Pittsburgh, but this community, has sustained a great loss. Mr. McDaniel entered the service of the Pennsylvania Railroad Company in February 1878 and continued in the service of that Company until the time of his death, at which time he held the position of Master Plumber of the Pittsburgh Division. He was a person most admired by those who knew him best, being endowed with sterling integrity, a noble generous nature, and an earnest and unpretentious Christian; a true friend of all needing sympathy or assistance.

Resolved: That we extend to his sorrowing family our sincere and heartfelt sympathy in this, the greatest of all afflictions, and be it further,

Resolved: That these resolutions be spread on the minutes of this Club, and a copy of same presented to the family.

M. A. Malloy,
H. M. Meason,
F. M. McNulty.
Committee.

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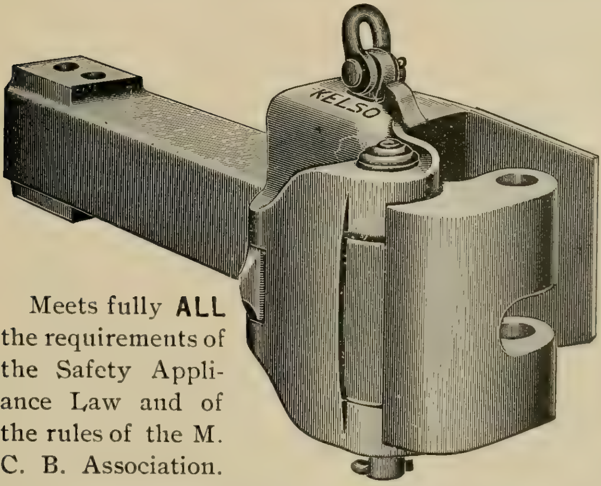

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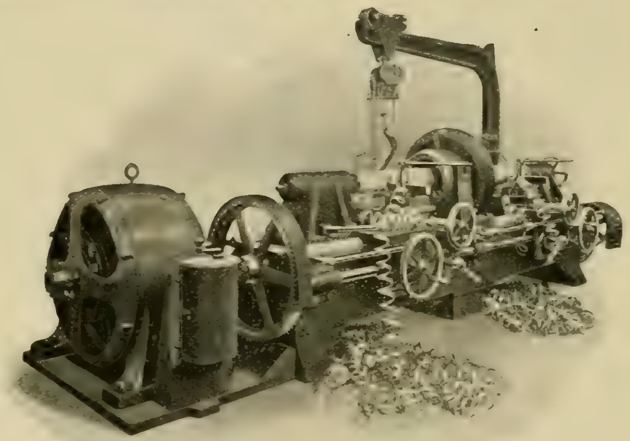

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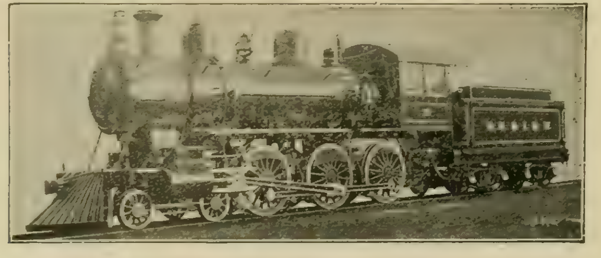

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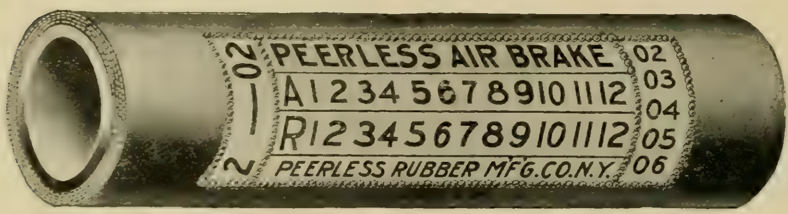
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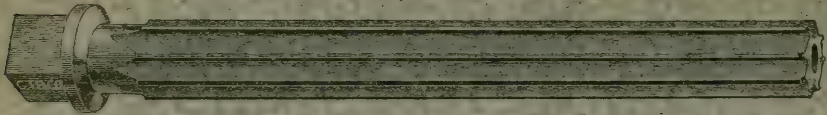

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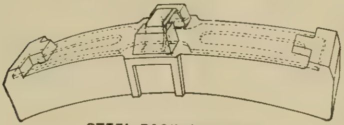

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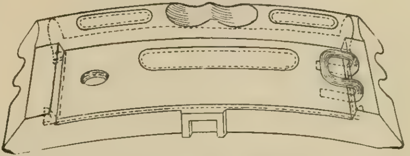

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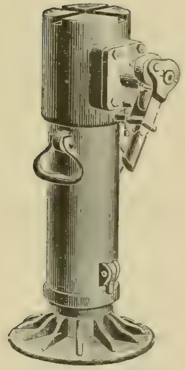

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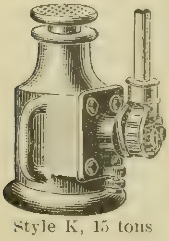

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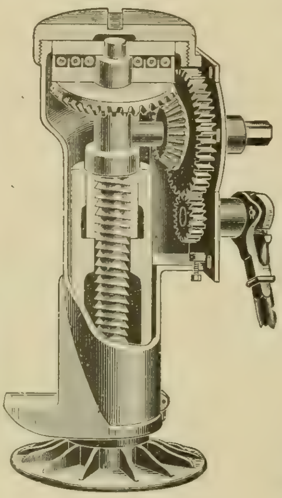

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of the
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ORGANIZED OCTOBER 18, 1901.

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Pittsburgh, Pa., May 26, 1905.

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Meetings held fourth Friday each month, except June, July and August.

PROCEEDINGS OF MEETING,
MAY 26th, 1905.

The meeting was called to order at 8 o'clock p. m. at the Monongahela House, Pittsburg, Pa., with President L. H. Turner in the chair.

The following gentlemen registered:

MEMBERS:

Anderson, H. T.
Barnsley, Geo. T.
Bealor, B. G.
Bell, W. K.
Blest, M. C.
Brand, Thos.
Brittain, Jno. B.
Caldwell, W. E.
Caldwell, Jos.
Carson, G. E.
Chittenden, A. D.
Coates, H. T., Jr.
Conway, J. D.
Courtney, D. C.
Cox, Geo. W.
Dambach, C. O.
Dow, G. N.
Forsberg, R. P.
Frank, Laurence W.
Freed, Geo. F.
Grooms, J. C.
Halleran, H. J.
Haring, Ellsworth
Haynes, J. E.
Hempsted, J. G.
Hirsch, Wm. L.
Hobson, J. S.
Hood, D. G.
Hooff, J. L.
Howe, D. M.
Hurd, A. B.
Huyett, E. G.
Isler, Chas. J.
Jenny, Jacob
Kessler, D. D.
Knickerbocker, A. C.
Lee, L. A.
Lindstrom, Charles
Lininger, W.
Lobez, Pierre L.
Long, R. M.
Lynn, Samuel
Malloy, M. A.
Miller, O.
Milligan, W.
McCaslin, A. W.
McMullen, F. V.
McNulty, F. M.
Noble, D. C.
Oates, Geo. M.
Porter, Geo.
Porter, H. V.
Proven, John
Redding, D. J.
Redus, A. E.
Sattley, E. C.
Scheck, H. G.
Schomberg, Wm. T.
Schoonmaker, Col. J. M.
Shaler, Fred J.
Shuck, Wm. C.
Smith, D. W.
Stark, B. F.
Stucki, A.
Tamkins, B. L.
Tesseyman, J. E.
Tucker, Jno. L.
Turner, L. H.
Walker, Geo. G.
Walsh, C. W.
Warne, J. C.
Watson, David
Wendt, Edwin F.
Yohe, J. B.
Zelch, J. L.

VISITORS.

Anderson, G. E.
Brashear, Dr. Jno. A.
Constans, Jules
Flanagan, Gerald E.
Frost. A. E.
Gardner, Henry
Gieg, John W.
Harper, M. I.
Henry, J. S.
Johnson, Jno. F.
Jones, Geo. E.
Kissinger, C. F.
Martin, S. C.
Murphy, W. J.
McGogney, S. M., M. D.
Neely, H. W.
Orr, J. W.
Rouch, T. T.
Roush, A. E.
Wood-Smith, G. F.
Smith, Sion B.
Strite, F. S.
Taylor, Ross
Zealand, T. H.

PRESIDENT: Gentlemen, the first order of business should be the reading of the minutes, but as they are in the hands of the printer, if there is no objection they will stand approved.

Secretary Conway then read the list of proposals for membership, as follows:

Mr. O. C. Dobson, Inspector, Pittsburg Testing Lab'y, 325 Water street, Pittsburg, Pa.

Mr. G. A. Suckfield, Head of Order Dept., Pressed Steel Car Co., 1023 Allegheny avenue, Allegheny, Pa.

Mr. Henry Gardner, Asst. Foreman, American Loco. Co., Pittsburg, Works, Bryant avenue, Bellevue, Pa.

Mr. Taber Hamilton, Asst. M. M., Pennsylvania R. R. Co., Verona, Pa.

Mr. J. T. Keithley, Gen. Foreman, H. C. Frick Coke Co., Everson, Pa.

Mr. F. L. Miller, Agent, P. R. R. Co., Shadyside Station, Pittsburg, Pa.

Mr. Philip Ross, Rep. The Cooper Process Co., Arrott Bldg., Pittsburg, Pa.

Mr. F. S. Strite, Supt., Pittsburg Car Service Asso., Westinghouse Bldg., Pittsburg, Pa.

J. W. Orr, Asst. to Comp. Pennsylvania lines, Union Station, Pittsburg, Pa.

PRESIDENT: As soon as these names have been favorably passed upon by the executive committee the gentlemen will become members of the club.

As we have a treat before us to-night, we will eliminate the other exercises. It is quite difficult to introduce a speaker when you are not familiar with what he is going to talk about, and more so when a speaker is a man of world-wide reputation and a master in the greatest of sciences. However, he is one of us. He is a Pittsburger. We are proud of his reputation and proud of him. And when I say to you that we will be addressed to-night by Dr. John A. Brashear, you will need no further assurance that we have a delightful evening ahead of us.

BUILDING OF A UNIVERSE.

By Dr. John A. Brashear.

DR. JOHN A. BRASHEAR: I heard Dr. G. Stanley Hall once tell of being introduced to an audience in a small Western town by the great political mogul of the place who, unfortunately for his position, did not know anything about Dr. Hall. He got up and said: "Ladies and Gentlemen: I have the pleasure of introducing to you ——." A gentleman sitting behind him punched him and whispered, "Dr. Hall." "Yes, Dr. Hall. Now, Dr. Hall is going to talk to you to-night on ——." Another punch from behind and a stage whisper, "On Child Life." "Yes, on 'Child Life.' Dr. Hall is going to talk to us on 'Child Life.' Now, Mr. Hall is from—— —— well, I don't know where the devil he is from, but he looks like he has a good deal of horse sense, and he can go ahead and fire away."

The trouble is that Mr. Turner gave me such a send-off that he made me feel like the fellow that had a farm that was so poor he couldn't raise mullein stalks on it. He concluded to sell it at auction, but the auctioneer praised it so highly that he bought it back again. My wife will probably think all the better of me when she hears the story that Mr. Turner told you on me.

However, I am one of you. And it is a delight to be among men who do things to make the world better. I bring you a big subject to-night, one that is too large for me to handle, yet one in which I believe every intelligent man is interested.

Whence comes this mighty universe? This is a question that has been asked ever since the dawn of science. It is a story that scientific men are constantly studying with the hope of being able to add a little to the sum of human knowledge There are a great many things in this world we don't know, nor is the scientific investigator the man who tells you that he knows it all, but when he discovers a new truth he delights in making it known to his fellow men. I have an old book written by the astronomer Huygens 200 years ago--and in it I remember reading these words, "What if I should go to the planet Mars and find people living there? What good would it do me if I couldn't come back to earth and tell it to somebody?

My subject to-night is the "Building of a Universe." I hope I shall not tire you. If I do, go to sleep, but for goodness sake don't snore.

Quite a good many years ago I stood on the bank of the old Ohio river where the curves of the railroad were being straightened out of the Ft. Wayne tracks and where they had cut a great deal off the hillside. On the hillside I saw a pretty fern growing. And upon looking closer I found that identical species of fern in fossil form beneath a hundred feet of rock strata, shale and clay. When I thought of the history of the fern that had grown there probably 50,000 or 100,000 years ago and saw the same species growing upon the side of the hill, how short was this time in comparison to the countless years it has taken to revolve this immense world of which we form so small a part.

I do not care how you take it, you may take the biblical account, the geological account, the astronomical account; take any department of science and we must go back untold ages, untold ages in the history of this universe to get back to the time that God said: "Let there be light," and there was light. There is something peculiarly interesting in this first chapter of Genesis, for it tells us, "In the beginning God created the heavens and earth. And the earth was without form and void. And darkness was upon the face of the deep. And God said, "Let there be light," and there was light. If you follow the astronomical record you will find it written in almost the same language as I am going to tell you to-night. And whether that good old man who is said to have written it was inspired or not, he must have known something about this great universe of ours.

"The earth was without form and void." When you study the history of the earth from the geological side you must dig down into its rocks and clay and shale, indeed, we are now at least in a measure able to follow the evolution of the earth by studying the strata that lies beneath us and follow it from the earlier times when the lowest forms of life existed, and then on until it has its completion, as it were, in man, and yet the question is now mooted whether man will be the end of the evolution of development in the history of the universe. But that is not a part of our subject to-night.

The astronomer has this advantage, if he is correct in his study, that he can commence with the evolution of the history of the universe right in the starry heavens themselves. He does not have to dig in the strata with pick and shovel, but he takes the three formidable instruments, the telescope, the spectroscope and the spectro-heliograph, and by their aid he is able to see back to the very beginning when the earth was "without form and void." It had no geometric shape and had nothing that characterizes it in its completed state, and he can still go farther, even to the dead world, aye, to the destruction of worlds —where, perhaps, the whole process begins over again.

I am going to tell you the story in picture, not a story painted by the hand of man, but painted by light that came from the objects themselves. In the last 20 years there has been a wonderful advance in the science of photography—yes, it has become a science. I can't remember, because it was the year I was born, 1840, that photography was practically invented. I had the pleasure of knowing the woman who sat for the first picture of a human face, and she told me herself that for that first picture she sat 90 minutes. Think of keeping a good woman still 90 minutes! Daguerre, who invented the first process, did not take a human form because his best pictures required an hour and twenty minutes of exposure. His pictures were from "still life." Our own Draper, in the city of New York, took the first good picture of his sister in March, 1840. She died only three years ago. I have her picture taken with a "poke" bonnet on her head that was taken, after great improvements were made in seven minutes. We have made photo-chronographs in our little work shop for taking photographs of a projectile from a cannon, which have been taken in one-hundred-thousandth part of a second. Photgraphs have been taken of the flight of the projectile not only outside, but inside of the gun. This shows a remarkable advance from the first picture taken in 1840.

And so it is with astronomical photography. I remember when the first pictures of a star were taken at Harvard observatory, when with the old collodion process they took a picture of Sirius, the bright dog star, in two minutes. Now we take it in two seconds. I remember the first picture of the Pleiades that was taken. In that first picture there were 1,323 stars on the plate; it was considered marvelous. The next picture was that made by Paul Henry, of the Paris observatory, and contained 2,600 stars. A few years ago a photograph of the Pleiades was made at Northfield observatory in which there are 10,000 stars circling around in that little group. I have seen a picture of the Milky Way in which over 200,000 stars are pictured on a plate 10 by 14 inches. And when you and I consider that on the finest night we have in Pittsburg, or any place else for that matter, only 3,000 stars can be seen by the naked eye, you can get some conception of how many have been reached by the photographer. Over 125,000,000 of stars, suns like our own, have been caught on the photographic plate. The entire heavens are now photographed every three or four months, so that if anything happens in the heavens the astronomer has only to go back and look at his plate taken a week or a month or six months before and get the history of the phenomenon from the time it was unseen until the time it had come into the range of human vision.

So stupendous is the distance of the stars that cataclysms in the universe that have occurred a thousand years ago we are just seeing now, although the light coming from them travels 186,000 miles a second. It is utterly impossible for us to get a conception of the immensity of this great universe of ours.

Before I tell you the story of the evolution of the universe I throw upon the screen the three instruments that are used in modern astronomical research, as they have aided so much in the solution of many of the mysteries heretofore totally unsolved.

First, I show you the reflecting telescope, which is used for astronomical photography. This instrument is the one used by Prof. Keeler, of the Lick observatory, and with which many of the pictures which I will show you have been made. The second is the spectroscope which, attached to the telescope, tells us the story of the physical nature of the steller worlds. The third is the spectro-heliograph, which not only tells us of the physical characteristics of the stellar worlds and particularly of our

THE GREAT NEBULÆ IN ORION.

Photo by G. W. Ritchey, Yerkes Observatory.

own sun, but reveals to us what is going on in the elements of which it is composed.

With these three instruments many new chapters have been added to the history of astronomy.

I throw upon the screen a picture of the great nebula in Orion. This picture was taken by the photographic process and the camera was exposed to the sky about four hours. We see in this beautiful nebula that which has no geometric form. You see the convolutions, the wonderful striations, the wisps and the condensations, nevertheless it seems to be "without form and void." This with many other nebulae in the heavens gives us a faint idea of how our worlds must have looked in their primordial stage.

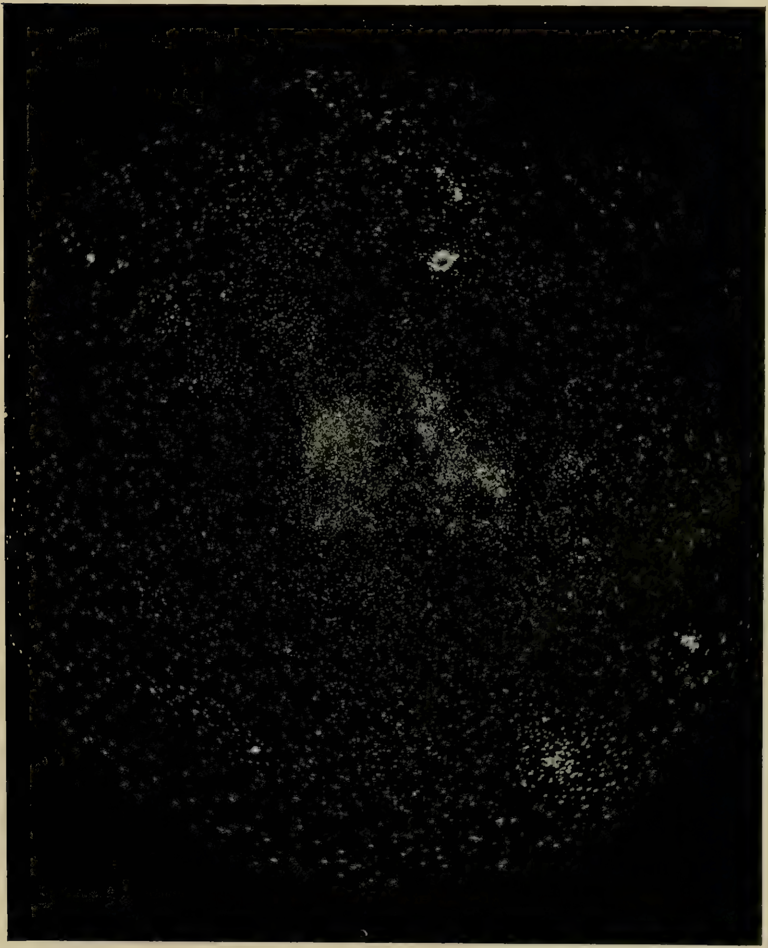
Some of these nebulae are very much less complicated, yet seem to be a shapeless mass of gaseous material—for the spectroscope shows the nebula to be almost entirely composed of hydrogen gas. There are a great many of these nebulae in the heavens. Probably more than a thousand of these shapeless masses of gas have been discovered, mostly by the aid of the photograph. This is considered the first stage in the evolution of the stellar universe. It is now considered by some that the nebula originally existed in the universe without any light-giving properties. The very result of activity developed in these nebulous masses produces light and heat. This heat starts them in motion, with the result, as you will see in the next picture which I have the pleasure of showing you, a totally different form, which seems to be a further stage of development in the nebulous masses.

Here you will notice the nebula takes a spiral form. It is not so strongly marked in this picture as in the pictures that will follow, but still it is not at all difficult to trace the spiral convolutions, nor is it difficult to see a condensed mass of nebulous matter at the center. You will note, further, in the picture that is now upon the screen that the spiral whirls seem to be separating into condensed cloud-like forms. And if you will look at the picture that is now thrown upon the screen you will see these condensations coming out in a very marked and sharp contrast to the first picture shown you. And this final picture of the spiral nebula is still more interesting, showing the formation, as it were, of a central sun and the individual agglomerations of nebula all around it looking almost like a little universe in itself.

In a letter from my friend, Professor Keeler, the late director of the Lick observatory, he informed me that he considered his most important discovery to be that the greater number of nebulae in the heavens partook of the spiral form. You will see, therefore, that this is another step in the evolution of our

THE SPIRAL NEBULÆ IN URSA MAJOR.
Photo by G. W. Ritchey, Yerkes Observatory.

universe. Look now, if you please, at the picture thrown on the screen, and you will see that our spiral nebulae have condensed into stellar forms, and you see before you a great group of suns —many of them probably larger than our own—and there are many hundreds of those suns gathered together in this great cluster. I show you now several of these clusters, among them the great cluster Hercules, in which there are so many suns that their light seems to overlap, and the central portion of this beautiful star system seems to be a great mass of suns gathered together.



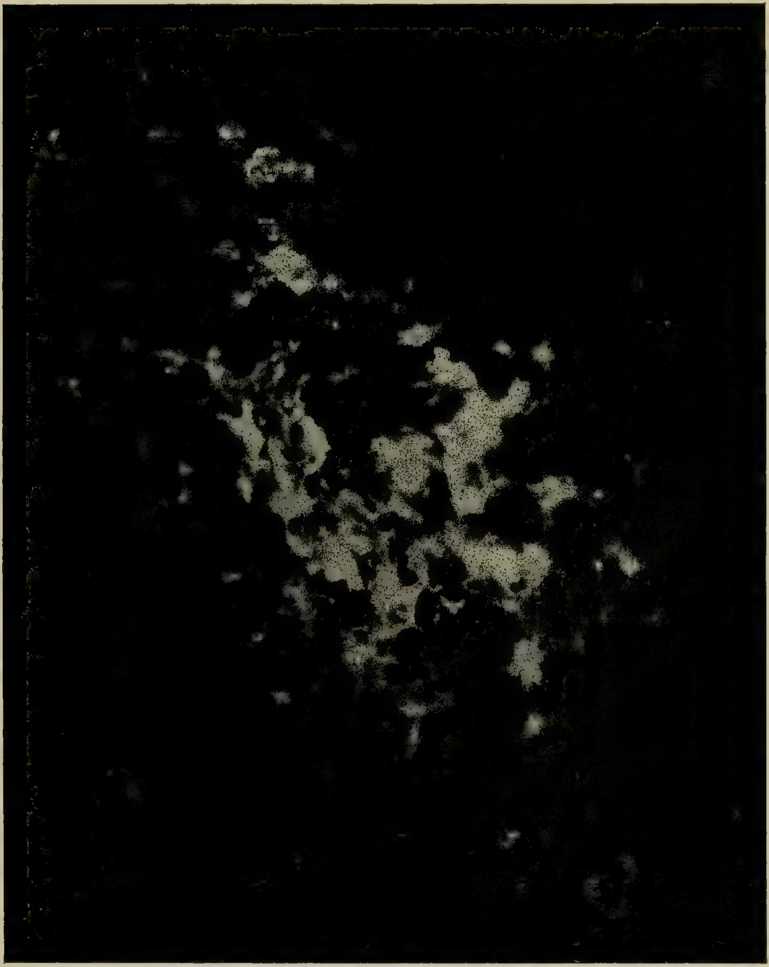
CLUSTER OF STARS IN SAGGITARIUS.

Photographed by Dr. Thome, Cordoba Observatory, Argentine Republic, with an Astronomical Camera made by the J. A. Brashear Co., Ltd. About 15000 stars photographed, not more than five of which are visible to the naked eye.

I desire you to have some conception of the immensity of this star cluster. Take, for instance, this little portion of the cluster which seems to be composed of five or six stars. If we take some of the stellar systems of the universe of a size comparable with this one and place our own solar system in the same apparent relation it would not cover one one-hundredth of the diameter of this cluster. So you see these stellar systems or clusters, are of immense magnitude, of which we can really have no adequate conception.

But now you will question when we come to this part of our subject, whence comes the planetary world or worlds like our own in this evolution? For a long time it was uncertain whether there were any dark worlds in the stellar universe like there are in this solar system of ours. We now have evidence upon every side that there are dark worlds floating around these suns in space, because some of these suns show unmistakable evidence of great change in their light value. Some of them change from stars of the second magnitude to stars of the seventh magnitude. It is now almost certain that this diminution in the light of a star is caused by dark bodies traveling in front of them, at least this is one of the causes of the diminution of the light of variable stars.

Many have asked the question, are these worlds inhabited like our own. We can only say that it is almost certain that there are worlds like our own in every part of the universe. But this would not be evidence of their habitability, or at least it would not be satisfactory to the astronomer. We now come to our own sun, the center of our great solar system. It is not one of the new suns that give out its light and heat like what we now call the "helium" stars, because they are many times hotter than our own sun, having been in all probability the first completed suns as developed from the nebula.. Then there are other suns very much hotter than our own sun, called the Sirian suns or stars. In all probability the star Sirius is twenty-five times brighter than our own sun and very many times hotter. Our sun has a temperature of something like the star Arcturus and other stars of a similar type. We may get some conception of the tremendous heat given out by our own sun when I tell you that it would warm up 2,200,000,000 of worlds like our own, and if you built a column of ice reaching from the earth to the moon and 15 miles in diameter and concentrate the heat of the sun upon it, it would be melted and dissipated into vapor in less than a second. And if we shoveled all the coal in the coal fields of Pennsylvania into the sun it would keep up its heat as it is giving it out now only one one-thousandth of a second. At one time it was thought that the great mass of meteors supposed to fall into the sun continuously would keep up its temperature.



SPECTRO HELIOGRAPH OF THE GREAT SUN SPOT OF OCTOBER, 1903.

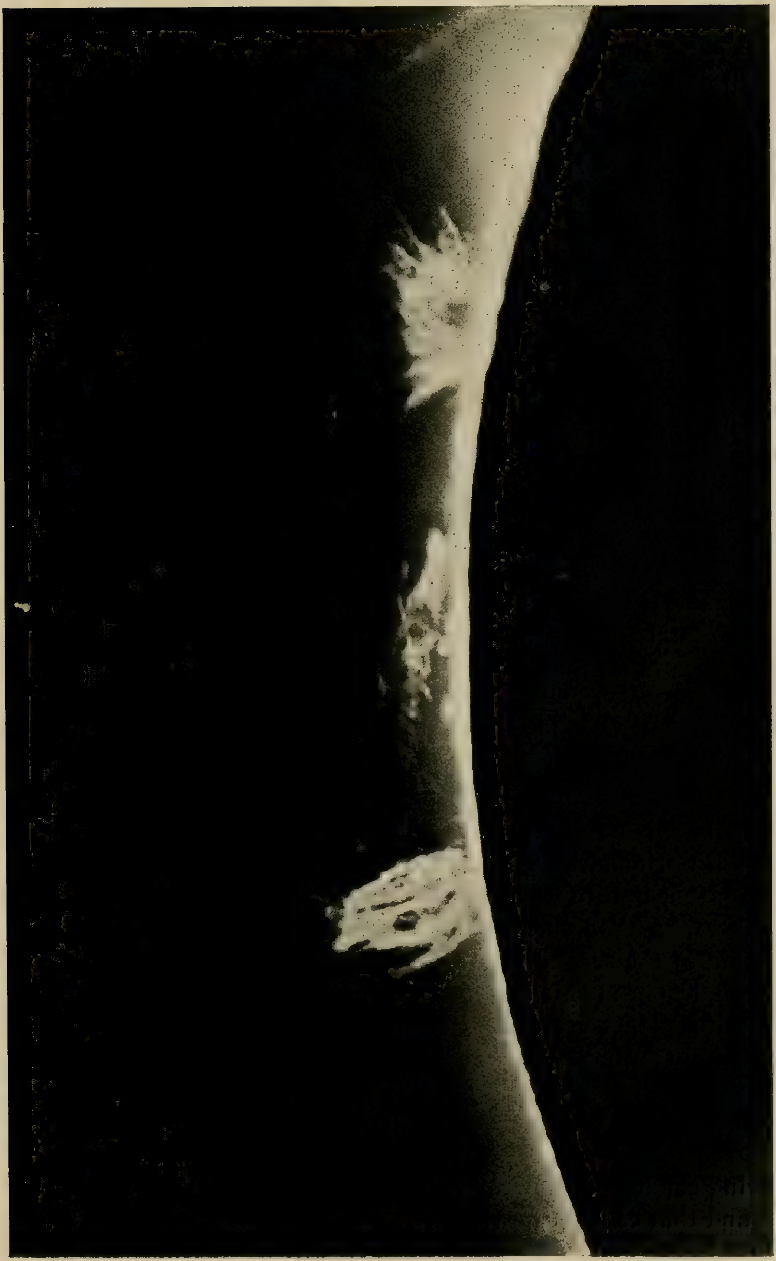
Taken by Dr. Geo. E. Hale, Yerkes Observatory.

But it is now known that this would be totally inadequate to keep up the solar heat the rate it is giving it out at the present time.

But a solution that is now entirely satisfactory has been given to us by several eminent astronomers and physicists and it is now almost certainly known that the sun's heat comes from its shrinkage upon itself. It would only require a shrinkage of 300 feet a year to enable it to give out or radiate its heat into space as it is now doing. There is no doubt that this tremendous energy is being dissipated into space, but it may be picked up by other worlds as they go along in their course through the universe, for it is known that we are moving in a straight line through the universe of stars at the rate of 12½ miles per second, or about 1,080,000 miles per day of 24 hours, and other stars with their systems are moving even more rapidly. It would be too long a story for me to tell you how this measurement is made, but within the next two years we will know for certain what the direction of our motion is and what is our rate of speed; it is not likely to be changed more than 10 per cent.

We here throw upon the screen an illustration of a great solar storm. It is a story in itself to tell you about this solar phenomenon, but I will only say that many people think these so-called spots on the sun will produce cold, while the fact is now quite well known that when such great spots occur they are caused by great cyclonic action, and in all probability the surface temperature of the sun is higher when this occurs than when the sun is absolutely quiescent, and it is now known that these spots are only dark by contrast with the brighter surrounding surface of the sun. Langley has, indeed, shown that the darkest part of a sun spot is 4,000 times brighter than the full moon.

When our sun was formed it was evidently the center of a little spiral nebula, little in comparison with many of those of which I have shown you pictures on the screen. When it was whirling around it sent off from its spiral arms Neptune, Uranus, Saturn, Jupiter, Mars, Earth, Venus, Mercury and a great coterie of little bodies called planetoids, of which there have been more than 500 discovered. Some of the bodies thrown off from the great central mass are still very hot, the planet Jupiter no doubt being almost red hot, for we see beneath



SOLAR FLAMES OF HYDROGEN GAS EXTENDING FROM 40,000 TO 70,000 MILES ABOVE THE SUN'S SURFACE.

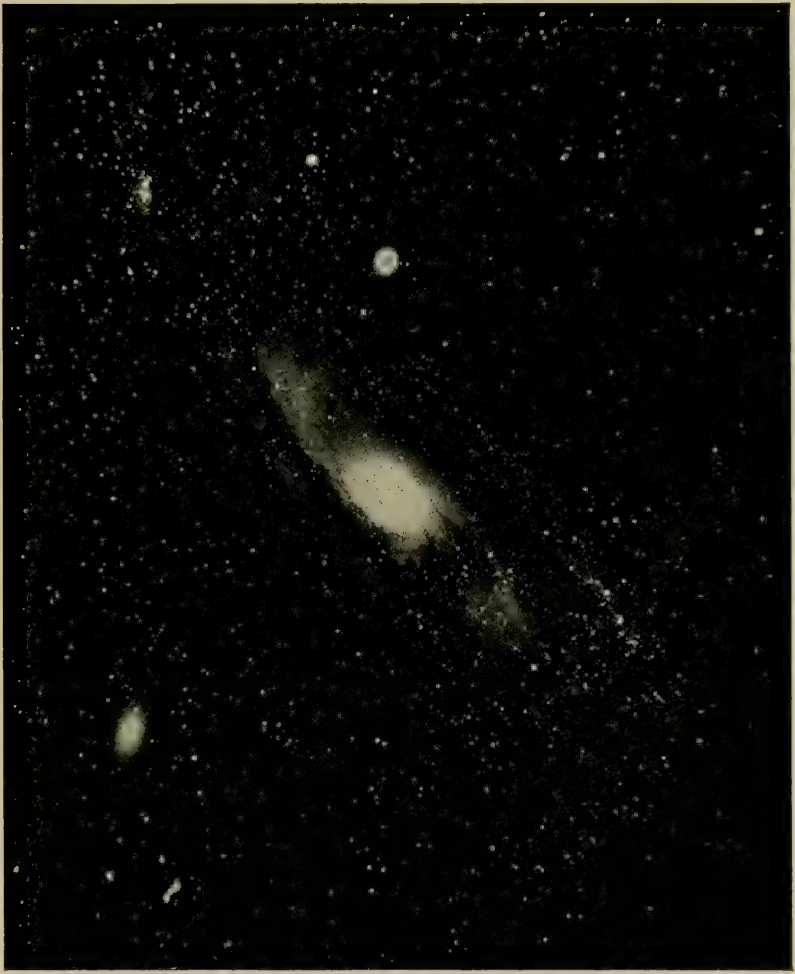
Photo by Barnard, Eclipse of 1900. Camera Lens made by J. A. Brashear Co., Ltd.

its great cloud-covered surfaces ever and anon great red spots that seem to indicate that the temperature of this planet is at least 1,000 degrees Fahrenheit. It is evidently not fit for human habitation.

But some of the worlds that are smaller in mass, like the planet Mars, have cooled off so much that they have probably gone beyond the stage of habitation and have reached a period when life has ceased to exist unless it may be in the equatorial regions of say this planet Mars. The picture I show you upon the screen gives evidence of a peculiar marking that has been thought to be works of the Martian engineers in the way of irrigating canals. Lowell believes that if they are canals, what we see is not the canal itself, but the vegetation that grows upon every side of it, like the vegetation upon the banks of the Nile. In fact, an object must be about 180 miles wide to be seen by all of the most perfect telescopes we have. Our earth is, so far as known, the only one of the planets in the evolution of our own solar system that is fitted for the habitation of man. It is likely that man has existed upon its surface for very many thousand years, and if the duration of the sun's heat is truly understood, life may exist for at least 10,000,000 years to come. So we ourselves are in no immediate danger of being frozen, even in our temperate zones.

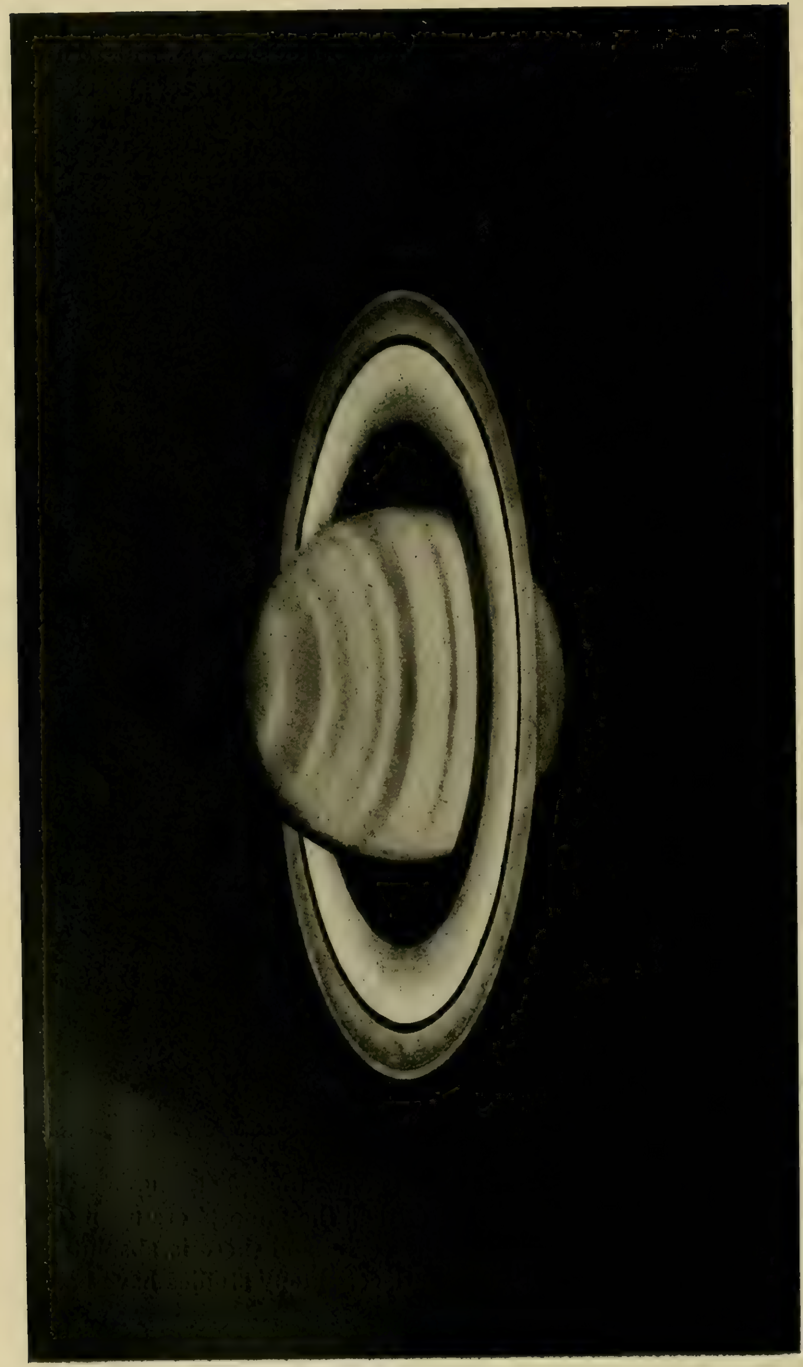
You will probably remember that among the pictures of spiral nebulae which I showed you was one called the great nebula on Andromeda. The formation of this marvelous object which is no doubt of untold extent, probably covering trillions if not quadrillions of miles, has its miniature in the beautiful planet Saturn with its ring system, which I now show upon the screen. And curious to say our own Professor Keeler, by the aid of the second instrument which I showed you upon the screen, has been able to prove conclusively that the rings of this beautiful planet are composed of minute meteoric bodies, each moving in an independent orbit. In order that you may see the wonderful similarity between this planet and the nebula in Andromeda I will place these two upon the screen together. You will see that they are built upon the same general plan, both having condensed centers and both having a double ring floating around that center, showing that a co-relation must exist at all times between all these formations in the universe.

We now come to another step, probably the last step in the evolution of the world system, namely the dead world. How many people ask us, is the moon inhabited? Well, it is absolutely certain that the moon cannot be inhabited by beings like ourselves. It is known that if there is an atmosphere upon the moon it is a thousand times rarer than the atmosphere upon the highest mountain peak upon the earth, and there is absolutely no evidence of water upon its surface. Many studies have been



GREAT NEBULÆ IN ANDROMEDA.

Photo by Ritchey, Yerkes Observatory.



THE PLANET SATURN.

By J. E. Keeler.

made of the lunar crater Plato to find evidence of vapor or atmosphere, the astronomers selecting this spot so as to concentrate their best efforts. But with the exception of one or two astronomers, all have practically agreed that they can see no evidence of water or atmosphere of any kind to sustain clouds or to produce refraction like we see it upon the earth every sunset and every sunrise. Professor Pickering, studying the crater Plato in the clear atmosphere of Chili, has thought at times that he saw a low-lying vapor at the base of the little craterlets on the floor of Plato, and it may be that there is still some internal heat in the moon which under varying conditions may throw out a little vaporous smoke, but as there is no atmosphere to sustain it, it must lie upon the floor of the crater and again be absorbed when reaction takes place. But still this remains to be proven, and Professor Pickering is at present continuing his studies upon this very interesting subject.

I throw upon the screen several interesting pictures of the moon. Photography has aided us immensely in delineating the features of this beautiful planet, for after all our moon is one of the minor planets. Among the beautiful scenery on the moon's surface none is more entrancing than the range of mountains called the Appennines. You see tall peaks, standing, some of them 29,000 feet high, casting their shadows as the sun rises upon them for a hundred miles upon the plains below. Some of the craters are of immense extent. Here is the volcanic crater Copernicus at the upper end of the Appennine range, that in all probability is the last or one of the last craters to form when the cooling surface of the moon solidified and here spent its last expiring force. Below it you see the beautiful range of the Alps, and a little to the west a valley extending for more than sixty miles along the base of the mountain. Not long ago a "cleft" was discovered running along almost the entire length. No doubt it would be an excellent place for a railroad to carry passengers up into the summer resorts at the base of the beautiful mountains and quite likely if some of our enterprising Pittsburg railroad men were there they would have it built in a jiffy and in all probability make it pay even at excursion rates for the inhabitants (?) of the moon.

But this world is dead and cold owing to the almost total absence of an atmosphere; its temperature at lunar midnight is

MOON IN HER FIRST QUARTER.

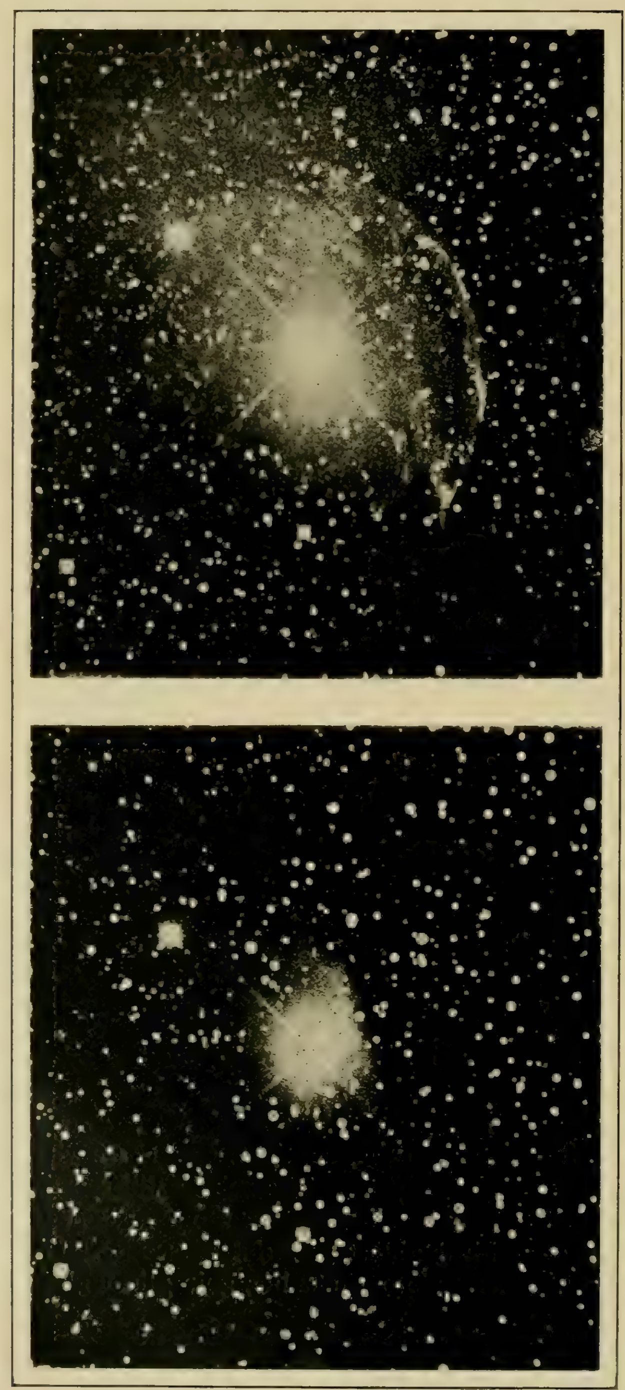
Photo by Ritchey, Yerkes Observatory.

no doubt very near the cold of outer space, or in all likelihood at least 450 degrees below zero. Fahrenheit. And it is now known that the temperature never gets above our freezing point. A description of the beautiful features upon the lunar surface, dead though it be, would take too much of our time, and therefore we must pass from this dead world to the conclusion of our study.

Is this dead world the climax of our evolution? Let us see.

A few years ago there burst forth in the constellation ot Perseus a bright star, which on the second night of its appearance rivaled Sirius in its brilliancy. Telegrams from the discoverer reached us the next day. The next night was cloudy, but on the second night after the announcement the spectroscope was attached to the telescope and it was seen that a great conflagration was taking place in that part of the heavens. But when did it take place? When was it discovered? When the Scottish astronomer discovered it? No. In all probability many hundreds of years before its light reached the earth, though light travels at the rate of 186,000 miles per second. You may ask how we can say that its light was so long in traveling to us. The astronomer has made an effort to measure the little condensation since it has dwindled down to the star of the tenth magnitude, taking as a base line the diameter of the earth's orbit, or 186,000,000 miles, but this great base line is too small to give us any parallax to the star and, therefore, we know that it is not less than one hundred trillions of miles distant from us.

What caused this star to burst forth? Evidently two stars traveling in opposite directions coming into collision, producing a marvelous outburst of flame and such a tremendous heat that if it has changed our stellar worlds, may-be dead worlds, back into their primordeal nebula. I throw upon the screen a picture of this beautiful and interesting phenomenon as it was seen in September of the year in which it occurred. I ask you to take note of the nebula surrounding it, which was not known before and which previous photographs did not show. And I ask you to look at a picture taken two months later, and see what a wonderful change has taken place. The nebula still remains in the sky, but the stellar disk has disappeared to the naked eye and is only now seen with the most powerful telescopes. Is this our stellar world, starting into a new life, going through its evolu-



NEW STAR IN PERSEUS, SHOWING THE MARVELLOUS CHANGE IN ABOUT TWO MONTHS.

One photo taken in September, the other in November, 1901.

tion again? The question is too stupendous for me to answer. But I leave it with you. There are so many beautiful truths in the world of science that it is ever entrancing to the one who is seeking after knowledge and to learn of the beautiful things that are around us and above us and beneath us. Surely, the study is an interesting one to the layman as well as to the astronomer And I trust that in telling it in my weakness I have given you some thoughts to take with you that will make you a little wiser and perhaps a little more thoughtful of the strange things that are continually evolving in this wonderful universe of which this little world forms an integral part. (Applause.)

A vote of thanks was tendered Dr. Brashear for the very interesting talk given the club.

There being no further business, upon motion the meeting adjourned and luncheon was then served.

Minutes of Meeting Railway Club Secretaries.

The annual meeting of the society of Railway Club secretaries was held Friday, June 16th, 1905, at the Oriental hotel, Manhattan Beach.

PRESENT:

Joseph W. Taylor, of the Western Railway Club, chairman; J. D. Conway, of the Railway Club of Pittsburg, vice chairman; Harry D. Vought, secretary of the New York Railway Club, and secretary-treasurer of the Central Railway Club, secretary-treasurer; James Powell, secretary of the Canadian Railway Club: J. F. Deems, first vice president, New York Railway Club; F. W. Williams, first vice president, Central Railway Club.

The secretary stated that Mr. Janes, secretary of the New England Railroad Club, was on the grounds to attend the meeting, but had been prevented from doing so by reason of a business engagement.

The minutes of the last annual meeting were read and approved.

The secretary-treasurer presented the following annual report, which was accepted and approved:

The past year has been more uneventful than usual in the business of your secretary, though this must not be construed as implying that this society has failed to continue the special mission for which it was created. Its usefulness is unimpaired and will continue just as long as there are railroad clubs and they employ secretaries to do the more onerous and detailed work incident to the successful and systematic conduct of an individual club.

It may be said without fear of contradiction or giving occasion for disputation, that the success of a railroad club is in a very large degree dependent upon the fidelity, intelligent effort and keenest appreciation of personal responsibility shown by its secretary. If he is equal to this and alive to a special duty he owes to the president and other officers of the executive board, the results of his labors will be satisfying and illuminating. At the same time they will contribute to the prosperity and activity of the organization, maintaining spirited interest and making sure that the full scope of its activities is being met.

It may be asked what relation do these academic considerations and truisms bear to this society and its excuse for living? The answer is short, sharp and decisive—everything. Many men make many minds, and surely as good comes out of Israel, out of many minds communing together there must be evolved some idea, some suggestion, some practical thought prompted by experience or discussion that we may each appropriate. If practicable these may be readily assimilated and applied with corresponding benefit to ourselves, and thus to the organization we represent which is of first consideration.

Even as the simple ripple excited by the splash of a pebble expands into a significant wave upon some other shore, so perhaps even one slight hint dropped into the stream of our official life may be pregnant with action and develop into a greater, stronger and more positive demonstrated fact that will help our respective clubs.

If with the publication of an annual index of subjects for club members the society fails to find any other function in which it can act for the general good of railway clubs and their membership, it will have accomplished an important work. It will have given proof that it is able to supply a medium that is esteemed of great value for reference. This has been brought home in a forceful way to your secretary through letters asking for copies of the index that have come from individuals, and from institutions and organizations, as well as for copies of official proceedings containing some specific paper or report mentioned in the index. It shows that the booklet is read and appreciated instead of being carelessly cast aside without examination, and that it is serving the very purpose for which it was originally intended. Certainly no one club or secretary would be likely to undertake and carry on the work of getting out such an index.

It is to be regretted that a larger number of officers, who are associate members of the society have not attended our meetings. They would doubtless have been prompted to offer suggestions that would have been helpful to their secretaries. But does not responsibility for this rest largely upon each secretary? Have they made diligent effort to obtain such attendance and to properly enlist the personal interest of their superiors—sufficiently impressed them with the fact that their presence and sympathetic co-operation is earnestly desired and would be appreciated. Every man has an opinion of more or less value, and often it serves to stimulate thought, zeal and action in some given direction that otherwise would not suggest itself, or is allowed to drift away unheeded. If each secretary would make the earnest individual effort that is always fruitful in result, would not these officers find it both mutually pleasant and profitable to spend an hour with us, and further the objective that was put before us when an organization of the secretaries was deemed wise and essential for the chief purposes to which allusion has here been made?

These thoughts came to my mind while giving preference last evening to considerations for our society's welfare, perpetuity and larger usefulness, instead of seeking the social recreations incident to the association conventions. They are submitted with the hope that they have not proved wearisome, and that they will not be deemed utopian, prosaic, or unnecessary speculative reflection which borders upon fallacy.

During the year the secretary has received $120. There was a balance in the treasury of $13.53, making the total receipts $133.53. The disbursements have been $5 for compilation of the official records of the society in permanent form, as authorized at our last meeting; $75 for the index ($5 less than the one previously issued), and $2.50 for postage, leaving a balance on hand of $41.03.

The needs of the society did not seem to justify an expenditure for official stationery, and especially without authorization therefor having been given either a year ago or the preceding year. The only appropriation asked for at this time is one of $5 for the services of a stenographer and an amount sufficient to provide official badges for new members.

On motion of Mr. Conway it was decided to continue the publication of the Index of Subjects.

In the discussion of ways and means for the advancement and welfare of the society, it was agreed upon the suggestion of Mr. Powell, that a committee be appointed to discuss and make recommendations at the next annual meeting upon the question of how best to procure and retain advertising for the official proceedings of the various clubs.

In the discussion of the matter of how best to obtain subjects for papers and authors to prepare same, the opinion was general that that was a matter which every club and its secretary would have to settle for themselves; but, it was argued, in the light of the experience of some of the clubs, that it had been found pleasant and profitable to vary the selection of subjects by occasionally having a paper on some question not of a technical character. Reports were received showing that illustrated lectures, smoking concerts and a ladies' night had proved enjoyable and had attracted an unusually large attendance at the meetings of the clubs which had made this innovation; also that it was conducive to the same results to induce transportation and traffic officials to read papers relating to their special field in railroad service, and that the effect had been in those instances to increase the membership of the club that arranged the varied programme for their season's work in the manner already indicated.

Chairman Taylor took occasion to again emphasize what he had said on former occasions in reference to the present method of interchange of proceedings between the clubs. In his opinion it was a mistake to have ever established the rule requiring members of an individual club to personally pay for the proceedings of sister clubs.

In answer to this, representatives of other clubs said that in view of the amount of entertainment given and the value of the proceedings of each individual club, with the enlightening information disseminated, club members thereof receive a commensurate as well as a generous quid pro quo for the amount they pay in annual dues. Therefore it could not be deemed a hardship to require them to pay a small additional amount not exceeding $1 for the proceedings of each of the other clubs, and if they failed for that reason to order such proceedings, it seemed to indicate that they did not care for them or failed to estimate them at their true value.

The secretary reported that the New York Railroad club, agreeable to the desire of the M. C. B. and M. M. associations, had for two years set apart one of its meetings for the discussion of subjects scheduled for the conventions of the M. C. B. and M. M. associations, and they had been among the most successful and satisfactory of the season's work.

Mr. Taylor called attention in this connection to the fact that the arbitration committee of these associations in the consideration of the rules of interchange had given much favor to recommendations of railway clubs. This was specially true of the Railway Club of Pittsburg, 10 of its suggestions for alterations in the rules having been adopted.

Mr. Taylor mentioning that this club has a standing committee on the rules, Mr. Conway was prompted to state that the work of this committee has been of very great value, probably accounting for the fact that the recommendations of his organization had commanded so much attention. He believes that the committee in question had recommended more important changes than any other club in the country, many of which had had the approval of the arbitration committee.

On motion of Mr. Powell the assessment per club for the season of 1905-06 was fixed at $10 to cover the running expenses of the society.

An appropriation of $5 was, on motion of Mr. Conway, authorized to pay for stenographic services performed in behalf of the secretary.

On motion of Mr. Conway the secretary was instructed to provide Secretary Powell, of the Canadian Railway Club, with an official badge, and also Secretary Woodruff, of the Iowa club, when that organization has paid its assessment for 1904-05.

Upon further motion of Mr. Conway it was ordered that the index when hereafter published shall include the rules and regulations of the society.

The election of officers resulted as follows:

Chairman, J. D. Conway; vice chairman, James Powell, secretary-treasurer, Harry D. Vought.

There being no further business the society adjourned.

HARRY D. VOUGHT, Secretary.

EDWARD KERR, President. ESTABLISHED 1891 W. R. BROWN, Treas. and Supt.

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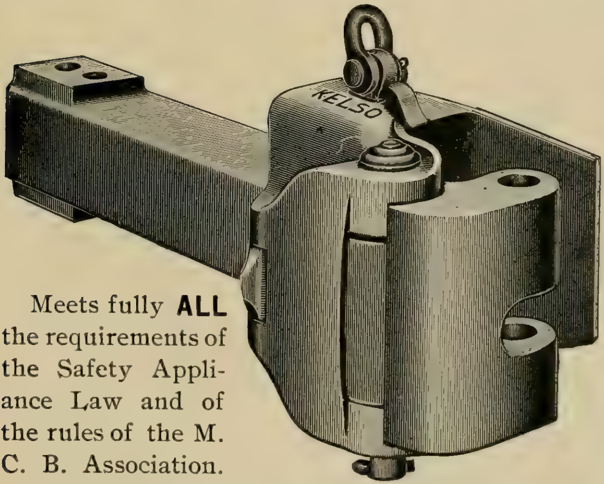

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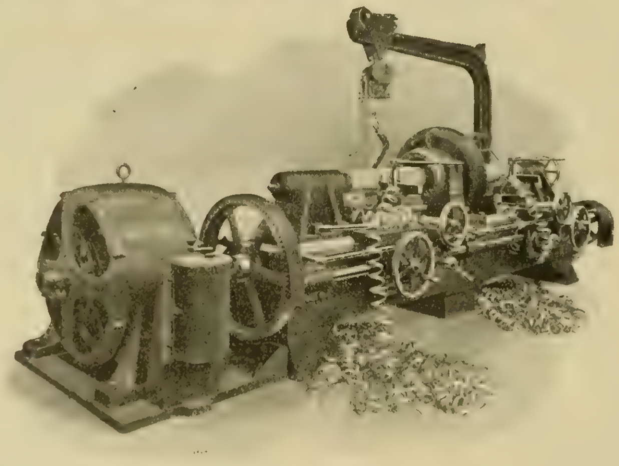

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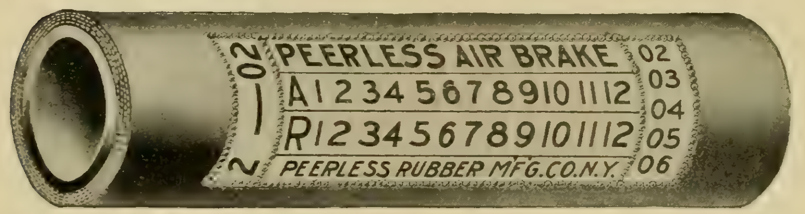
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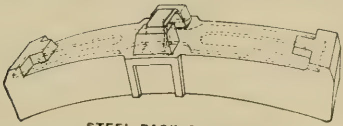

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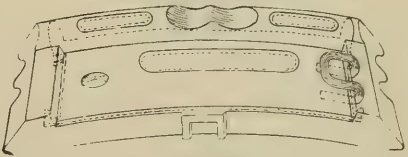

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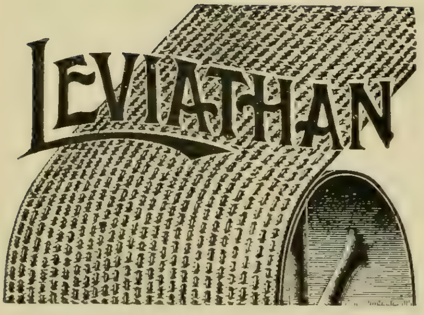

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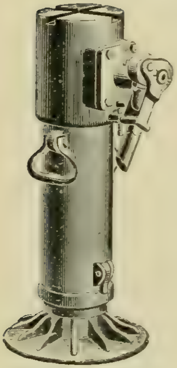

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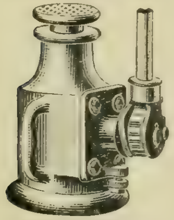

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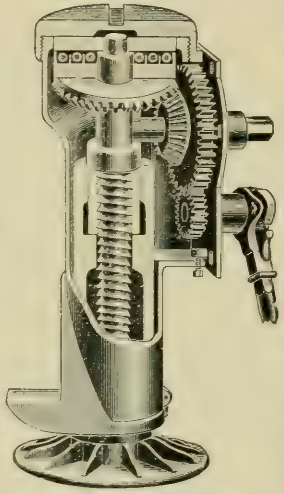

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of the

Railway Club *of* Pittsburgh.

ORGANIZED OCTOBER 18, 1901.

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Supt. Motive Power, P. & L. E. R. R., Pittsburgh, Pa.

Vice-President,

……………………………………

Treasurer,
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Sales Agent, J. D. McIlwain & Co., Pittsburgh, Pa.

Secretary,
J. D. Conway,
Chief Clerk, Supt. M. P., General Offices P. & L. E. R. R., Pittsburgh, Pa.

Executive Committee,

E. M. HERR,
Gen'l Manager Westinghouse Air Brake Co., Pittsburgh, Pa.

……………………………………

F. H. STARK,
Superintendent Rolling Stock, Pittsburgh Coal Company, Coraopolis, Pa.

VOL. IV.
No. 8.
Pittsburgh, Pa., Sept. 22, 1905.
$1.00 Per Year
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Published monthly, except June, July and August, by the Railway Club of Pittsburgh,
J. D. Conway, Secretary, General Offices P. & L. E. R. R., Pittsburgh, Pa.

Meetings held fourth Friday each month, except June, July and August.

PROCEEDINGS OF MEETING,
SEPTEMBER 22d, 1905.

The meeting was called to order at 8:00 o'clock, p. m., at the Monongahela House, Pittsburgh, Pa., with President L. H. Turner in the chair.

The following gentlemen registered:

MEMBERS.

Ayers, H. B.
Barnsley, Geo. T.
Barwis, J. McC.
Bole, Robt. A.
Brittain, Jno. B.
Brown, John T. Sr.
Carson, G. E.
Coates, H. T. Jr.
Conway, J. D.
Courtney, D. C.
Cox, Geo. W.
Daugherty, J. B.
Davis, Tom R.
Decker, O. S.
Dow, G. N.
Dyer, J.
Foller, Chas. S.
Gearhart, J. A.
Gies, Geo. E.
Gray, Robert.
Greeve, H. F.
Hamilton, Taber.
Harris, J. D.
Henderson, J. W.
Hermen, R.
Hirsch, Wm. L.
Howe, D. M.
Hunter, H. S.
Hunter, Robert F.
Hurd, A. B.
Jeny, Jacob.
Jennings, F. R.
Kleine, R. L.
Knickerbocker, A. C.
Knight, E. A.
Lobez, Pierre L.
Long, R. M.
Lynn, Samuel.
Malloy, M. A.
Mason, Stephen C.
Melson, W. C.
Milliken, I. H.
McIlwain, J. D.
McKee, F. E.
McMullin, F. V.
McNulty, F. M.
Oates, Geo. M.
Parker, H. G.
Partington, Jas.
Peach, W. M.
Porter, H. V.
Quest, F. E.
Redding, D. J.
Reese, F. T.
Riley, J. W.
Rosenstock, J. H.
Sattley, E. C.
Scheck, Horace G.
Schomberg, W. T.
Shannon, Chas.
Shaw, O. M.
Slocum, A. W.
Smith, C. G.
Smith, D. W.
Stark, B. F.
Stark, F. H.
Strattan, G. W.
Stucki, A.
Suckfield, G. A.
Summers, E. W.
Swann, J. B.
Sweeley, G. P.
Tamkins, B. L.
Taylor, H. G.

Tesseyman, J. E.
Thomas, Chas.
Tracy, M. S.
Tucker, John L.
Turner, L. H.
Walker, Geo. G.
Warnock, H. R.
Watts, H. W.
Watson, D. H.
Weigel, F. S.
Wendt, E. F.
Whitney, Louis B.
Yohe, J. B

VISITORS.

Allen, Harvey.
Anderson, A. E.
Branson, C. R.
Brown, John T. Jr.
Cleburn, S.
Collier, P. M.
Coulter, A. F.
Gailey, S. C.
Graham, W. C.
Heer, Chris.
Hetzel, J. W.
Hurd, D. F.
Lowry, R. N.
Martin, C. A.
Millar, Clarence W.
Mowry, Jas. G.
Murphy, W. J.
McDonnell, F. V.
Painter, Joseph.
Pratt, H. A.
Robbins, J. E.
Sandman, A. G.
Smith, Sion B.
Streib, J. F.
Wells, D. L.
Wells, M. E.
Wood, W. H.

PRESIDENT: As you have already received the minutes of the last meeting, if there are no objections or corrections, they will stand approved as printed.

Secretary J. D. Conway then read the list of applications for membership as follows:

Bailey, Chas. D., Res. Mgr., Frank S. DeRonde Co., 312 Ferguson Bldg., Pittsburgh, Pa.

Basford, G. M., Care American Loco. Co., 111 Broadway, New York, N. Y.

Branson, Craig R., Special Apprentice, Penna. Co., 1120 Allegheny Ave., Allegheny, Pa.

Brown, John T. Jr., Supt. Duquesne Reduction Co., 5448 Stanton Ave., Pittsburgh, Pa.

Brown, Geo. P., Shop Clerk, Penna. Co., 1119 Franklin St., Allegheny, Pa.

Day, Edward B., Res. Mgr., Ry. and Engr. Review, 301 Farmers Bank Bldg., Pittsburgh, Pa.

Elliott, J. B., M. M., B. & O. R. R. Co., New Castle Junction, Pa.

Giesey, V. A., Rep. Harbison-Walker Ref. Co., Farmers Bank Bldg., Pittsburgh, Pa.

Krauth, S. F. Rep. Pgh. Spring and Steel Co., Farmers Bank Bldg., Pittsburgh, Pa.

Lynn, P. A., Supervisor, Pgh. Car Service Asso., Westinghouse Bldg., Pittsburgh, Pa.

Mason, R. L., Mgr. Railway Dept., Hubbard & Co., Pittsburgh, Pa.

Meredith, H. P., Asst. Engr. Motive Power, P. R. R., 1214 13th St., Altoona, Pa.

Mitchell, J. W., Rep. Brown & Co., 10th St., Pittsburg, Pa.

Murphy, W. J., Asst. Foreman Boiler Shop, Penna. Co., 1004 Lamont St., Allegheny, Pa.

McDonnell, F. V., Foreman, Penna. Co., 1016 Lamont St., Allegheny, Pa.

Newland, H. F., Electrician, Penna. Co., 608 California Ave., Avalon, Pa.

Pittis, Edward A., Rep. Midvale Steel Co., 111 Broadway, New York, N. Y.

Pogue, Robert, Foreman Boiler Shop, Penna. Co., 1415 Franklin St., Allegheny, Pa.

Reid, John Jr., Mgr. Brick Dept., International Supply Co., 805 Frick Bldg., Pittsburgh, Pa.

Schleiter, W. F., Secy., Dilworth-Porter & Co., 313 Sixth Ave., Pittsburgh, Pa.

Searle, J. M., Consulting Engr. Pgh. Stoker and Mfg. Co., 2525-45 Liberty Ave., Pittsburgh, Pa.

Shaw, W. F., Chief Draughtsman, Motive Power Dept., P. & L. E. R. R., Terminal Station, Pittsburgh, Pa.

Simm, J. C., Treas., Machinists Supply Co., Water St. Pittsburgh, Pa.

Wood, W. H., Foreman Brass Fdy., Penna. Co., 1005 Lamont St., Allegheny, Pa.

Zinsmaster, F., Foreman Eng. House, Penna. Co., 18 Ivanhoe Ave., Emsworth, Pa.

Brown, A. D., C. C. to Gen. Supt., P. & L. E. R. R., Terminal Bldg., Pittsburgh, Pa.

Turner, F. M., Gen. Supt., Allegheny & Southside Ry., Corner 10th and Muriel Sts., Pittsburgh, Pa.

Woodford, W. R., Vice President Pittsburgh Coal Co., Pittsburgh, Pa.

Powell, F. H., Trainmaster, P., C. & Y. Ry. Co., McKees Rocks, Pa.

Wells, M. E., Trav. M. M. Wabash R. R., Pittsburgh, Pa.

Woodside, S. P., Traffic Mgr. Pgh. Coal Co., Pittsburgh, Pa.

Graham, W. C., Mgr. of Works, Penna. Mall Co., McKees Rocks, Pa.

Prout, Col. H. G., V. P. and Gen. Mgr. Union Swith and Signal Co., Swissvale, Pa.

Pratt, Howard A., Rep. Hukill-Hunter Co., 311 First Ave., Pittsburgh, Pa.

Hornberger, J. B. L., comp. Pbg. Coal Co., Pittsburgh, Pa.

PRESIDENT: It is a very gratifying list. When the names have been passed upon by the Executive Committee the gentlemen will become members.

This is the last meeting before the annual election of officers. It will be in order to have a nominating committee appointed.

ON MOTION of Mr. D. M. Howe, the Chair is instructed to appoint a committee to make nominations for officers for the ensuing year. The Chair appoints as such committee Messrs. D. M. Howe, L. B. Whitney and R. A. Bole.

PRESIDENT: It has been deemed wise by a number of the members that we have one or two new committees, and in order to do so it will be necessary to change the By-Laws. Our Constitution and By-Laws provide that suggested changes must be read before the Club one month prior to being voted upon. The Secretary has such a proposal and will kindly read it, and at the next meeting we will be prepared to vote on it.

Believing it to be to the best interest of the Railway Club, we, the undersigned members, suggest the following changes be made in the By-Laws and Constitution, to be voted upon at our next meeting in October:

Article 4. Constitution changed to read:

"The officers of this Club shall consist of a President, First Vice President, Second Vice President, Secretary, Treasurer, Finance Committee consisting of three members, Membership Committee consisting of five members, and three Elective Executive Members who shall serve a term of one year from the date of their election unless a vacancy occurs, in which case a successor shall be elected to fill the unexpired term.

Article 5. Constitution changed to read (Section 1):

"The President will preside at all regular or special meetings of the Club and perform all duties pertaining to a presiding officer; also serve as a member of the Executive Committee.

(Section 2.) "The First Vice President, in the absence of the President, will perform all the duties of that officer; the Second Vice President, in the absence of the President and First Vice President, will perform the duties of the presiding officer. The First and Second Vice Presidents shall also serve as members of the Executive Committee."

A new section 6 to be added to Article 5, to read as follows:

"The Finance Committee will have general supervision over the finances of the Club, and perform such duties as may be assigned them by the President, or First and Second Vice Presidents."

A new section 7 to be added to Article 5, reading as follows:

"The Membership Committee will perform such duties as may be assigned them by the President or First and Second Vice Presidents, and such other duties as may be proper for such a committee."

E. Z. JEFFERSON,
M. S. TRACY,
GEO. W. COX,
A. W. SLOCUM,
GEO. T. BARNSLEY,

JOHN T. BROWN, SR.,
R. L. KLEINE,
D. WATSON,
D. M. HOWE,
L. H. TURNER,
J. D. CONWAY.

PRESIDENT: This brings us to the paper for the evening, which will be read by Mr. A. Stucki, on "End Shocks in Car Service and Provision for the Same in Car Framing."

End Shocks in Car Service and Provision for Same in Car Framing

By A. Stucki, M. E.

With the introduction of high capacity cars and the increasing demand for a maximum revenue for money expended in rolling stock, car building has just as much become a theoretical problem as building of locomotives, bridges, machinery, etc. The main object is the carrying of as great a load as possible on a car made as light as possible consistent with proper strength. This point is generally understood and usually receives the attention it deserves, and the matter was greatly simplified when the M. C. B. Association adopted some standard loads as a basis for the construction of the cars and the interchange between adjoining roads. The car specifications, the governing guide between owner, user and builder of the car, always mentions the load which is to be carried and as a rule gives the distribution of the load and the fibre stress due to such a statis load, thereby defining every detail in this direction.

However, there are other strains coming on the car besides those just mentioned. They are always present whenever the car is in transit and are caused by what we may term "End Shocks." These are very severe at times and it is safe to say that by far the largest proportion of the damage is done by this class of strains. Notwithstanding this fact, no attempt has been made as yet to agree upon certain service conditions which the cars should be required to meet and which also could be used as a basis in handling the cars in the yards and the trains on the road, and it is the aim of this paper to indicate a general outline along which a solution of this whole problem seems practicable, and it will especially deal with the following points:

1. Present service conditions.
2. Present car equipment.
3. Advantages of a standard to regulate both.
4. Best basis for such a standard.

Present Service Conditions

Owing to the general introduction of the automatic couplers, of longer trains, faster speed, heavier cars and heavier locomotives, the end shocks in the service have gradually increased year by year. Complete data as to just what they amount to is, however, not at hand as yet, but we know approximately what strains are created, in certain trains, handled in certain ways. For instance, the draw bar pull of a heavy locomotive of to-day may be considered to be 50,000 lbs. Tensile strains between the cars in long trains, handled carefully, may be regarded as 50,000 lbs; handled ordinarily, 80,000 lbs., and handled roughly 100,000 lbs., while the buffing strains can be considered 100, 150 and 200,000 lbs., respectively. In fact, in a great many cases this figure exceeds 300,000 lbs. And cases are known to exceed the capacity of the measuring apparatus. In reality there is no limit and no established line as yet whereby a shock could be classified as a service condition or as an accident. (For further figures see the proceedings of the Western Ry. Club of May 20, '02, showing the results of extensive tests made by a Committee, of which Mr. W. H. Marshall was chairman.) These figures were obtained by the use of a dynamometer car, and therefore are reliable as far as they go, in as much as the actual condition of the tracks, the locomotive, the drop gear, and the stiffners of the car frame are all taken care of. In fact, there is no other practical way of obtaining correct information on this line. Since the above tests were made the writer is not aware of any additional ones carried on in a systematic way.

The question is very important since in the interchange of cars 60, 80 and 100,000 lb. equipment is intermixed in long trains, which means that light constructions and heavy ones are subjected to the same forces, or same end shocks, because the latter, once set up, are actually the same, no matter what the capacity of the car may be. Likewise do we find the wooden cars run between those built of steel, with occasional results well known to us.

Present Car Equipment

Although the whole train is practically subjected to the same end shocks, a great difference in strength can be found in the equipment forming the same.

A good spring draft rigging has now a capacity of about 40 to 60,000 pounds, and a friction draft gear of possibly 180,000 pounds. The cross sectional area of a shank on a steel coupler is about 12 square inches, while the center sills of one of the hopper cars, a great many of which have been built, has a cross sectional area of 11.31 sq. in. In addition to this the diagonal braces amount to 1.14 sq. in. in the line of the centre sills. This makes a total cross sectional area of 12.45 sq. in. per car. The offset between the centre of the coupler and the centre of sills on top of the centre plate amounts to 2½″, and the body bolster tie plates have not been figured as assisting the diagonal braces any. These cars give very good results in actual service and if the elastic limit of the steel used is considered as 28,000 lbs., the actual results and the tests above referred to corroborate each other.

One of the large Railway systems has recently increased the respective cross sectional area on the hopper cars.

On the tank cars, recommended by M. C. B. Association, 30 sq. in. are required in the centre sills. In many cases no side sills exist and the car frame being always as low as possible, there is actually little or no offset in the height between the centre of coupler and centre of sills.

In the cars with wooden underframes, there is often a great deal of timber present, and the frequent failures are not at all due to a lack of timber, but they are mostly due to the large offset between the centres of coupler and centre of sills, and also to the fact that a rational connection between the different timbers is almost impossible, and in the critical moments the bolts, instead of strengthening the underframe, tend to split and break up the timber.

On the other hand, a very large number of cars are built and equipped in such a way that it is not safe to run them in the long trains of to-day and their strength is entirely inadequate for such a service. Many roads realize the danger due to this source and endeavor to protect themselves in making their equipment now to meet the worst conditions. Other roads do not think themselves justified to store up so much material without getting any revenue from same. However, they are compelled to haul their neighbors' heavy cars without getting any additional compensation. It is also self-evident that their light equipment will have to act as yielding material for the heavier cars, in case the end shocks exceed the capacity of the draft riggings.

A standard in this respect is an absolute necessity.

Advantages of a Standard

This would at once establish a line at which a car may be considered safe without wasting any excessive amount of material, a guide for those inclined to build strong, and a caution for those in favor of extremely light cars.

On the other hand, it is plain that the damage to the rolling stock as a whole would be decreased enormously, first, on account of establishing a certain standard in handling cars and trains, and, secondly, in increasing the minimum strength of the train without increasing its tare weight. This in turn would mean:

Less work on the repair tracks;
Greater average mileage per car in a given time;
Greater average revenue per car in a given time;
Greater average life per car.

I heard a Superintendent of Motive Power remark the other day that no matter how well a new thing is gotten up, or how true its underlying principles are, it is not to be recommended unless it will show up on the right side of the balance sheet, and he is quite right about that. For this same reason a standard in this respect will enable the motive power and mechanical departments to determine whether a construction will really pay or whether it may mean a loss in the end.

Best Basis for Such a Standard

The next question is: "What should be adopted as a basis in determining the strength of a car lengthwise?" A.—Certain cross sectional area. B.—A certain fibre stress under a certain shock.

If the first plan is adopted, it might be a comparatively easy matter, provided each type of car is treated separately. It would, for instance, not be fair to require the same cross sectional area for a gondola car as for a flat car, because the sills in the latter are already heavily strained by the load, while in many gondola cars the sills do not carry but a very small proportion of the lading. Great care would naturally have to be taken in compensating for the existing vertical offsets between the centres of couplers and sills.

If the latter plan is adopted, and it looks to me that it should, the question may arise whether the car should be considered loaded or empty, when considering its resistance. Neither case would be correct and each part of the car should be figured under those conditions which produce a maximum combined fibre stress. In most cases this will happen with the load applied; in some cases the fibre stress will be greatest on an empty car, and again there are cases where the load has no effect whatsoever upon the stresses under discussion.

If pursuing this plan (one road entering Pittsburg has done this already), all that would be necessary is to agree upon a certain fibre stress under a certain shock. In as much as these severe concussions fortunately do not occur so often, the fibre stress, if produced by said shocks, can be allowed to be much higher than those brought about by the load alone.

Such a plan of determining the longitudinal strength of the car has the advantage of being applicable to any type of car, no matter what the construction or the arrangement of the sills may be, and being based on the fibre stress it always discloses the real condition of the car. It may be claimed that this method is laborious. It is to a certain extent, but it only affects the designer who has to figure the different details. anyhow; while the writing up of car specifications will be very much simplified. A few sketches below will show how it can be figured quickly, and will also suggest in what direc-

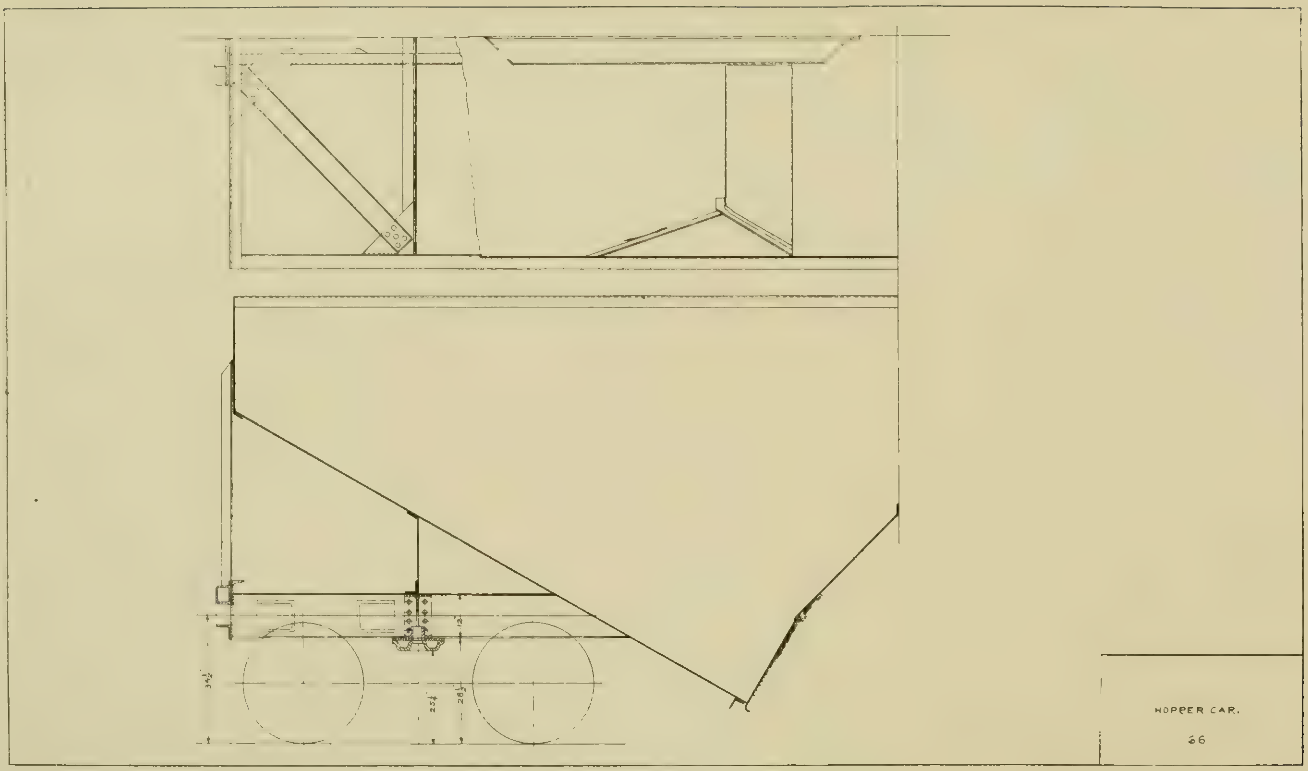


FIG. 1.

tion we will have to work in order to get a strong car lengthwise, without increasing its weight unnecessarily.

Fig. 1 shows part of a hopper car. The conditions are very favorable, in as much as the center sills are practically not strained by the load and are ready to exert their full resistance in taking the end shocks. The sills are shown to be of 12″, lowered to come central with the coupler and to avoid any eccentric blow. By taking the 25 lbs. channel, we would get 14.70 sq. in., and counting on 5 rivets in each end of the diagonal brace passing through 5-16″ material, will amount to 2 x 5 x 13-16 5-16—2.5 sq. in. in two braces, and will, considering the angularity of these braces, be equivalent to an additional cross sectional area in line of the car of 2.0 sq. in., giving a total of 16.3″, which under an end shock of 300,000 lbs. would produce a fibre stress of approximately 18,300 lbs.

This seems to be a sufficient strength for an occasional shock, but it may be considered that for this type of car a greater end shock should be figured on as a basis, especially since in the specific coal trade the cars at times are exposed to a good deal of unreasonable punishment.

It will be noticed that the height from top of rail to top of truck bolster is but 25¼″, which is less than the height of the majority of the trucks now in existence, but this question is of such vital importance that a change in this direction by the different roads would increase the life of the cars very much, and finally would also result into a standard height of truck, which in itself would be of great benefit to all concerned.

Fig. 2 shows an all-steel gondola car with 12″ centre sills. Since the car sides are expected to carry the load, the remarks made above apply also here, but in this case a larger portion of the end shocks will be transmitted to the sides of the car, so that all the material which runs continuously from body bolster to body bolster near the lower edge of the car sides is utilized. In this connection it is very important that the splices in the floor sheets and side sheets do not come in line, so as to get as much material as possible to act as a compression column, and the floor sheets near the centre sills will also increase the strength in that direction. However, it will be

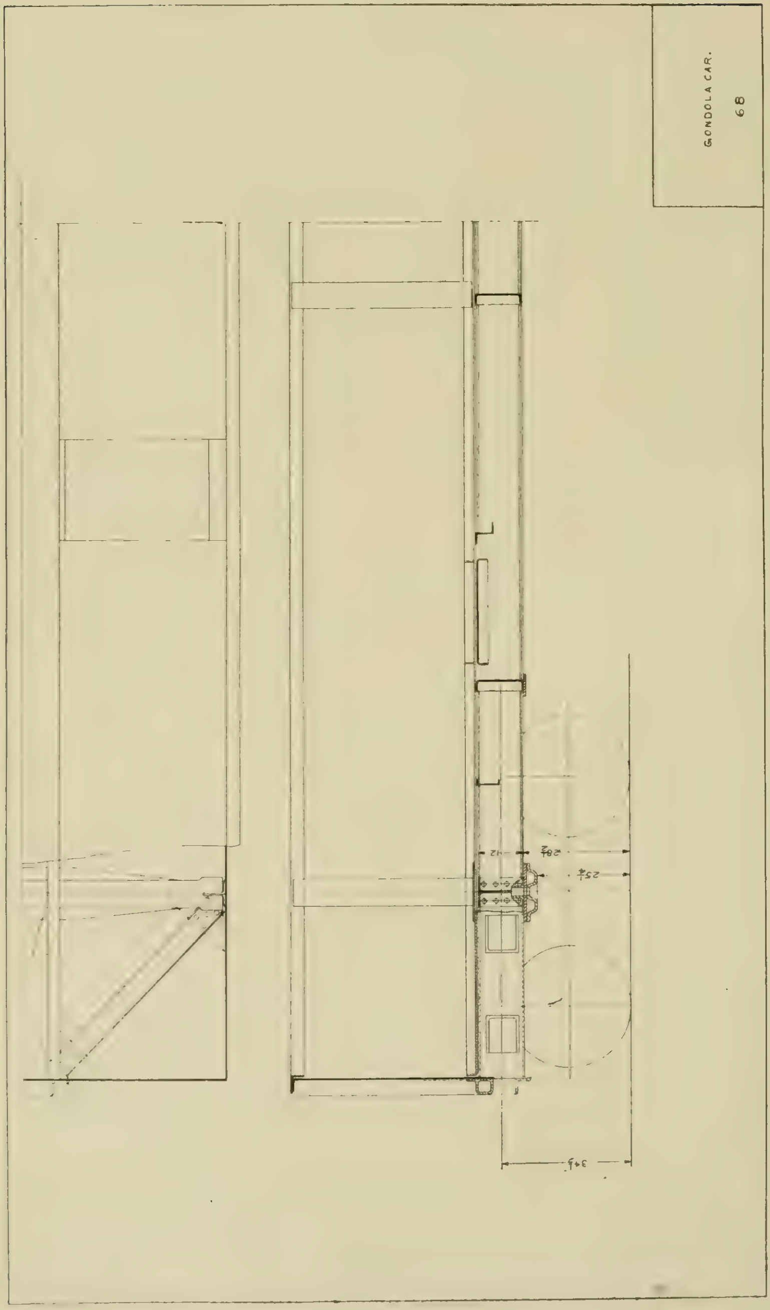


FIG. 2.

borne in mind that these sheets are not continuous and are liable to be mutilated and partly destroyed in many ways.

Fig. 3 shows a sketch of a 100,000 lb. composite flat car. The centre sill consists of a web plate, a cover plate, 2 top angles and 4 bottom angles. All members project through the body bolster and are supposed to be well connected with the draft rigging. Here the stresses will run comparatively higher than in the other types of cars, owing to the fact that the sills in the first place have to carry the load and that the shocks under consideration will increase the fibre strains, already present, to an alarming degree.

Most of the end thrusts come again on the centre sills. Only a small proportion is transmitted to the channel side sills by the diagonal braces and the body bolster tie plates are not wide enough to materially enter into this function.

The centre of coupler is 1½″ below the centre of gravity of the sills at the bolster and 6″ above the same in the centre of the car.

The combined maximum stress in the centre sills at the body bolster is in the lower edge and is that due to the load, plus that due to the end thrust working on a 1½″ affect.

In the centre of the car the maximum combined stress occurs in the upper edge and is that due to the load, plus that of the end shock working on a 6″ affect.

In case 15″ rolled channels with the maximum effect are to be used, it would be desirous to drop the bottom of the centre sills another 1½″, which may be in some cases somewhat troublesome; however, with cast bolsters it can be done successfully. One of the eastern roads has gone much lower yet, but, as already said, this would not be possible with built-up bolsters.

We have another means by which to drop the cars and to bring them in direct line with the coupler, this is a good design of a side-bearing truck, but not having been tried out sufficiently it would be premature to suggest the use of same at this time.

The scope of this paper did not permit of going into the details of this important subject, and the writer had to content himself by simply a few all-around figures to illustrate the whole situation.

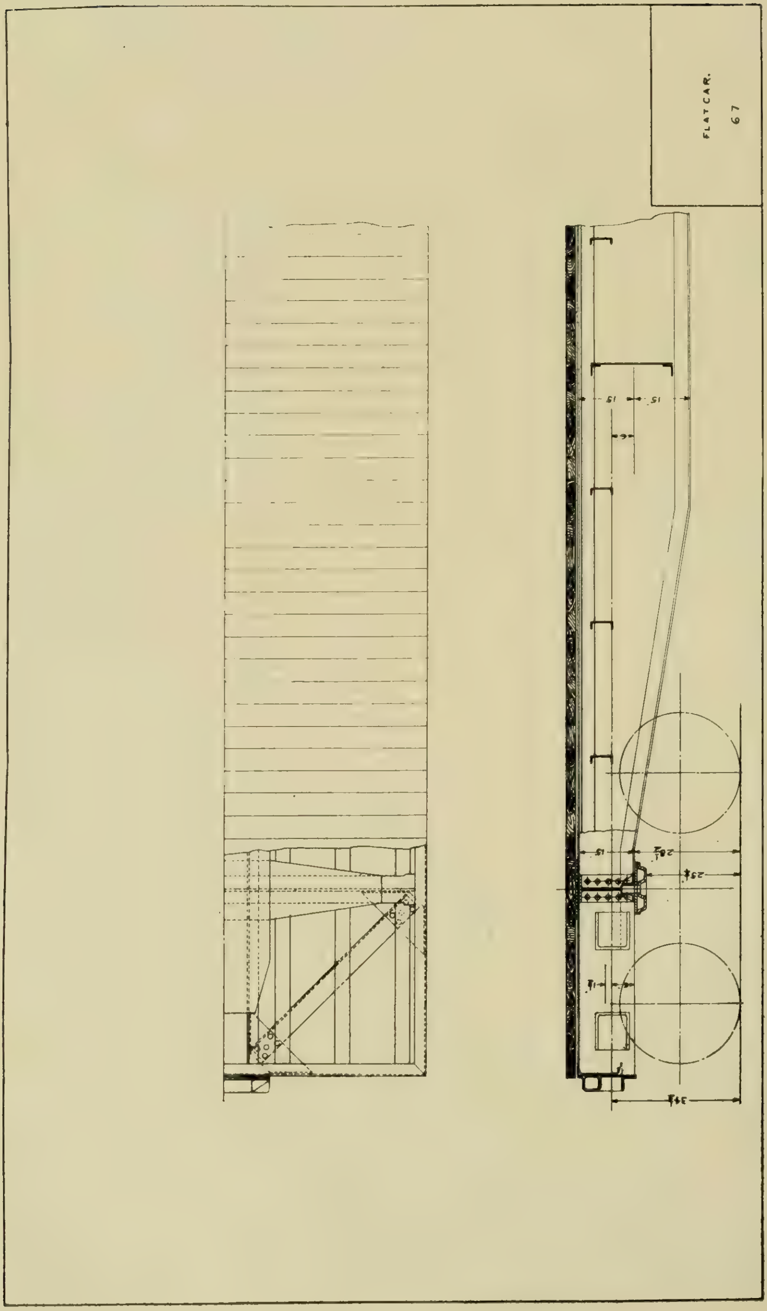


FIG. 3.

PRESIDENT: Gentlemen, this is a very interesting paper and presented by one who is thoroughly familiar with the subject, and we ought to have a good discussion. Mr. Reese, may I ask you to open the discussion?

MR. F. T. REESE: Mr. President, this is somewhat unexpected. Just coming in, I haven't had an opportunity to give the subject as careful consideration as I should have desired. However, I may say in regard to one thing that Mr. Stucki has not placed the buffing shocks very high. The Lake Shore made some tests with the Westinghouse dynamometer car some few weeks ago and we found in these tests from 400,000 to 500,000 pounds as the buffing strains incident to ordinary service, and from 110,000 to 130,000 pounds in draw bar tensile strains. I think that the proposition of putting as much material in the center sills as can be put there is a very good idea from a practical standpoint. The Standard Steel Car Co. when I was with them built some cars for the B. & O. railroad in which the center sills were designed to carry the entire load as shown in Mr. Stucki's paper, last page. The cross members taking the place of I beams were designed so that the load was carried from the outer sills to the points of intersection with the center sills, the center sills being designed to carry the entire load. By this arrangement we got a depth of about 30 inches in the center sills, which were made up of two plate girders, and the cross sectional area of the center sills at the center of car was about twice that you ordinarily get in the center sills of steel underframe cars as usually designed. With that depth the deflection was but very little, and you have a car that will withstand almost any shocks. These are the cars that were used in the tests by the Lake Shore road, and after the very severe strains to which these cars were subjected there was nothing after a thorough inspection that we could find that was damaged about the car underframing. Of course we believe that this was largely due to the dissipating effect of shocks upon the draft gear. However that may be, the car was designed with the principle of carrying the load entirely on the center sills, which may be somewhat opposite to the views held by some designers, but I believe that eventually these cars will prove that is the proper way to design a composite car to take care of the severe end shocks, which we know are increasing in intensity.

PRESIDENT: Mr. Summers, may we hear from you on this subject?

MR. E. W. SUMMERS: Mr. President and Gentlemen—I think the importance of Mr. Stucki's paper is one that all railroad people and car designers should consider. I think it is a very important matter from a number of points of view, to establish a standard, or in other words, decide upon the amount of buffing shocks which the car must sustain, the idea being to enable all builders of cars to figure on the same stress in material. The matter of taking the stresses, as indicated in the paper, in most all cars through the center sills is one on which I have expressed myself before this Club some two and a half years ago. With flat cars, tank cars, box cars, and hopper cars, with some exceptions, I agree with Mr. Stucki and other car designers. With regard to the size of the center sills, I think they should be determined also by the lateral resistance they have. For instance, take a channel; it has much lateral resistance in the plane of the web or vertically. Sideways it can be deflected very easily, so that in hopper cars, where no floor plates are attached and the distance between supports in many cases is great, this should be taken into consideration.

The matter of placing draft rigging in the center of gravity of the channels I think an important one when the channels are not reinforced by cover plates top and bottom. The draft rigging should, if possible, be placed in the center of gravity of the material that transmits the stress.

In the matter of all steel gondola cars, and by all steel gondolas, I mean flat bottom cars, not a gondola hopper car, I do not think this subject is properly understood by the majority of car builders. The members which transmit the stress have been touched upon in Mr. Stucki's paper—that is other members than the draft sills. I would like to go farther with it. I think the question as applied to gondola cars has not been gone into as it should be. There are undoubtedly a great many gondola cars that stand up to the work. You can see them all over Pittsburg. These cars, having large enough cubic capacity to contain 100,000 pounds of soft coal, must be extended quite a distance. Such cars which resist the severe service they get in the Pittsburg district are quite heavy. I have made no effort to look up the weight of these cars, but I think it safe to say that their weights go from 38,000 pounds up. Now it is my opinion that there is excessive material, or material not properly distributed in them. The question of transmitting the entire buffing and vertical load stresses through the center sills is not economical from the fact that the center sills must necessarily be shallow, and all engineers know the difference in value of beams of varying vertical height. The side girders of the all steel gondola car, especially those for carrying 100,000 pounds of coal, are necessarily deep and are much better proportioned for carrying the vertical load with economy than the shallow center sill. There are many cars in the Pittsburg district that have been built at a less weight than the figures I gave a few minutes ago.

Since the subject of this paper was made known to me a couple of days ago I took my camera out through the yards and made some pictures of some of these light-weight cars. We sometimes see things better by having them brought right before our eyes. From the top of a box car I took several pictures. One of them shows an all steel gondola car with a general arch sidewise in the top flange of the side girder, possibly sprung out at the center as much as 12 inches, a regular curve from end to end. There are other cars here, hoppers, with wavy, zig-zag tops. This I call Exhibit A.

Here is another view taken from the top of the same box car. This is not a rail fence, it is the top of a gondola car, though it looks like one or two panels of a rail fence. A little farther down there are some more zig-zags. This I call Exhibit B.

I got down from the box car and went over two or three tracks and took what I will call a sky line of an all steel gondola car. You can see the wavy effect. This is Exhibit C.

This is the picture of a bunch of ten or twelve cars. The middle of the second one is resting on the ground. The third one is rather sway backed, and with its sides spread out. This fourth one is down about two-thirds of the way to the ground, and the fifth all the way down. The others you cannot distinguish in the picture—though I think you will all admit it is more of a success as a picture than they are as cars. This is Exhibit D.

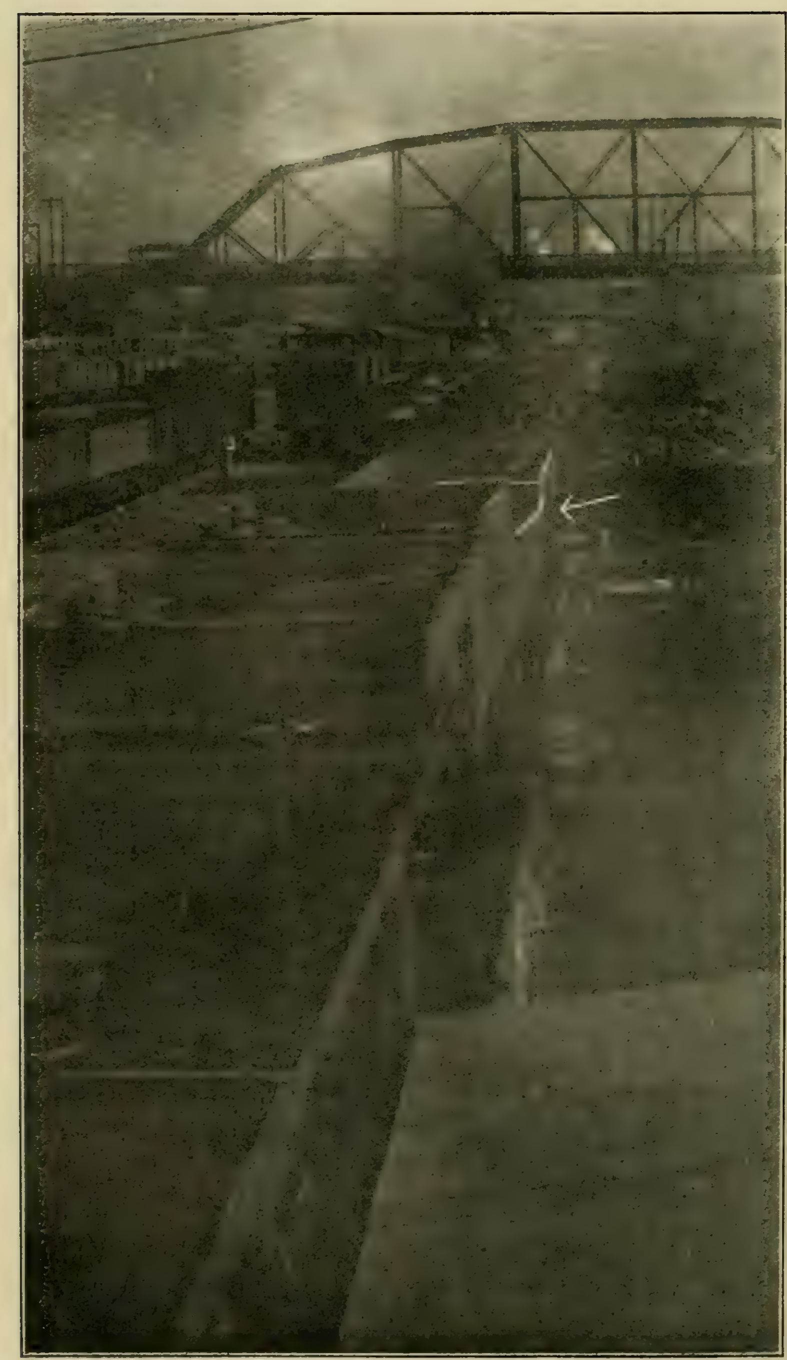


Exhibit A.

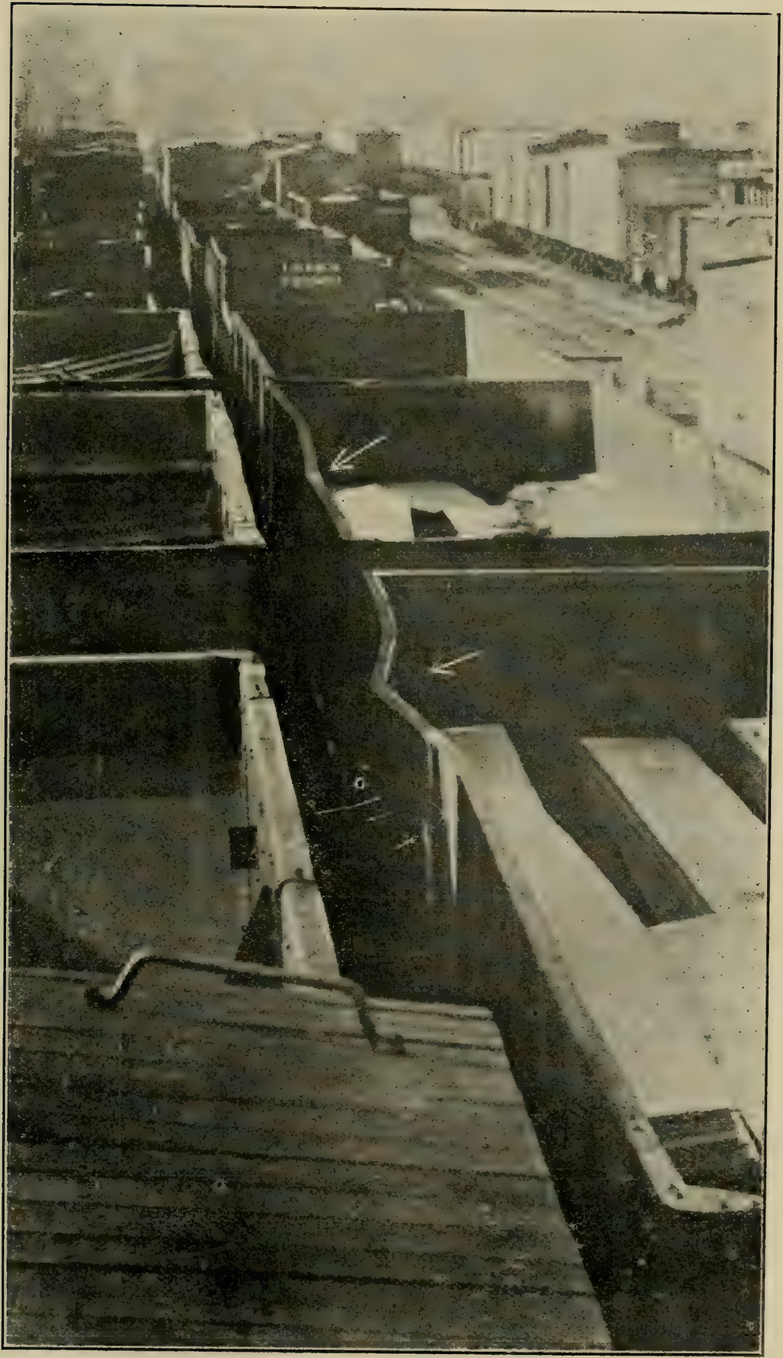


Exhibit B.

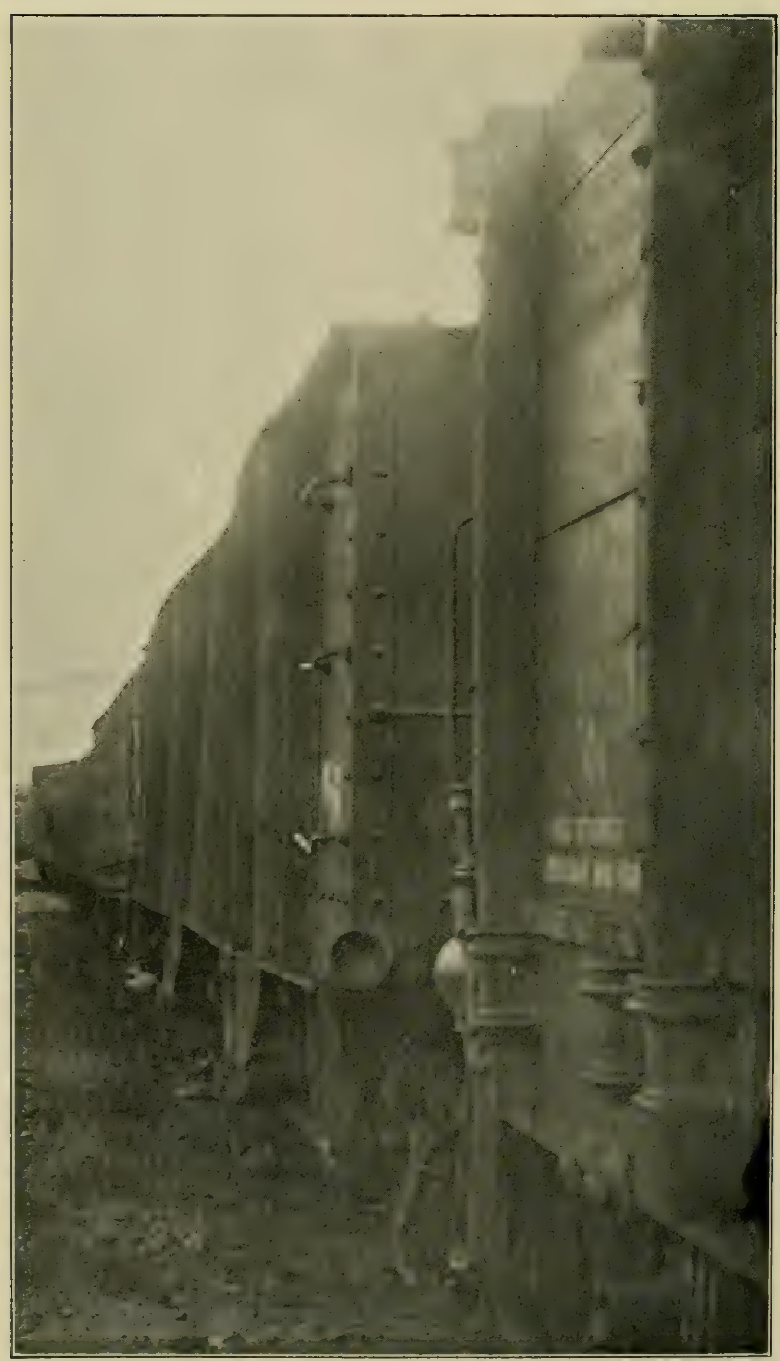


Exhibit C.

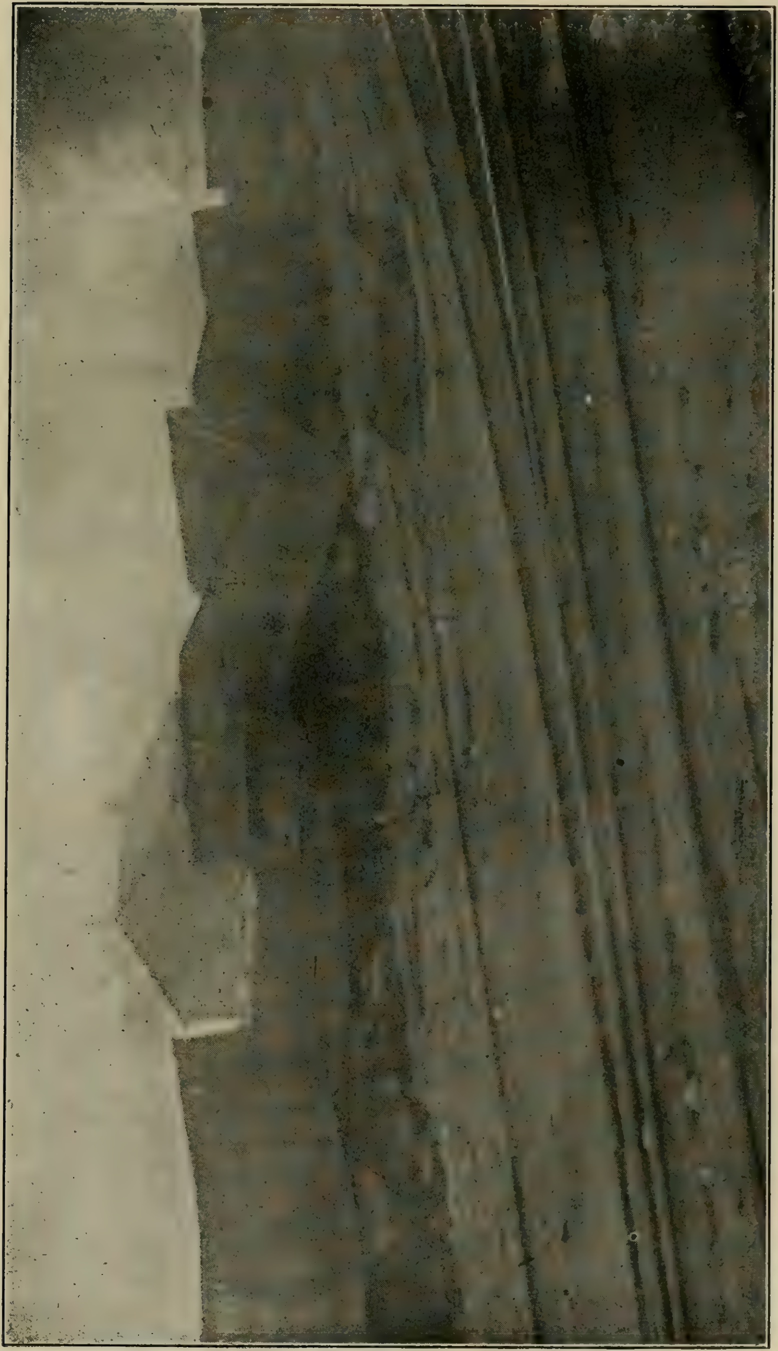


Exhibit D.

When I was before this Club two and a half years ago I brought up a subject which is very closely allied to this one, "Steel Cars Without Center Sills." A good many of my friends got the idea that I did not recommend putting center sills in any car. I stated in the first place that I agreed with the general car builders with regard to center sills in certain cars. But I was met with open arms and threshed around considerable—I enjoyed it I think fully as much as anybody else. I was told that such a car as I recommended would not stand the buffing shocks that it would get just from shifting around the yard. I am told to-night that these shocks run up to 400,000 and 500,000 pounds. They told me that night that calculating the elastic limit in the material which had to transmit the buffing shocks in this car, if I remember aright, would be reached at a buffing shock of 40,600 pounds. But those cars have been in service between three and four years now, and they must have had more than 40,600 pounds a good many times. I have a picture of one of them that has been in service that length of time, which I will call Exhibit E. It is not a small car, and will hold all of 110,000 to 120,000 pounds of coal. It is 38 feet long, sides 4 feet above the floor. It has no center sill. It has twin pockets in it and large diaphragms extending crosswise below the floor for a side dumping arrangement, which adds materially to its weight. The weight of this car with 16,400-pound trucks is 36,600 pounds. With these cross diaphragms taken out and making it a plain flat bottom gondola of this capacity, the weight will not exceed 34,000 pounds. This car has been loaded with over 200,000 pounds of iron ore and its deflection was measured, which amount was practically 3-16 of an inch in 28 feet. This car was loaded with another car, or a portion of it, over on the C., A. & C. road about a year ago by having it pushing in over the end. This car was standing next to the last car in a train when another train came along at about 30 miles an hour and hit the last car and demolished it, pushing it partly into the car here shown and only bending its end sheet in at the top. The repairs necessary were to take off the end sheet of the car, straighten it and rivet it back, and there was something done to the draft rigging and the truck, the amount of which I am not informed. That was a severe strain for a

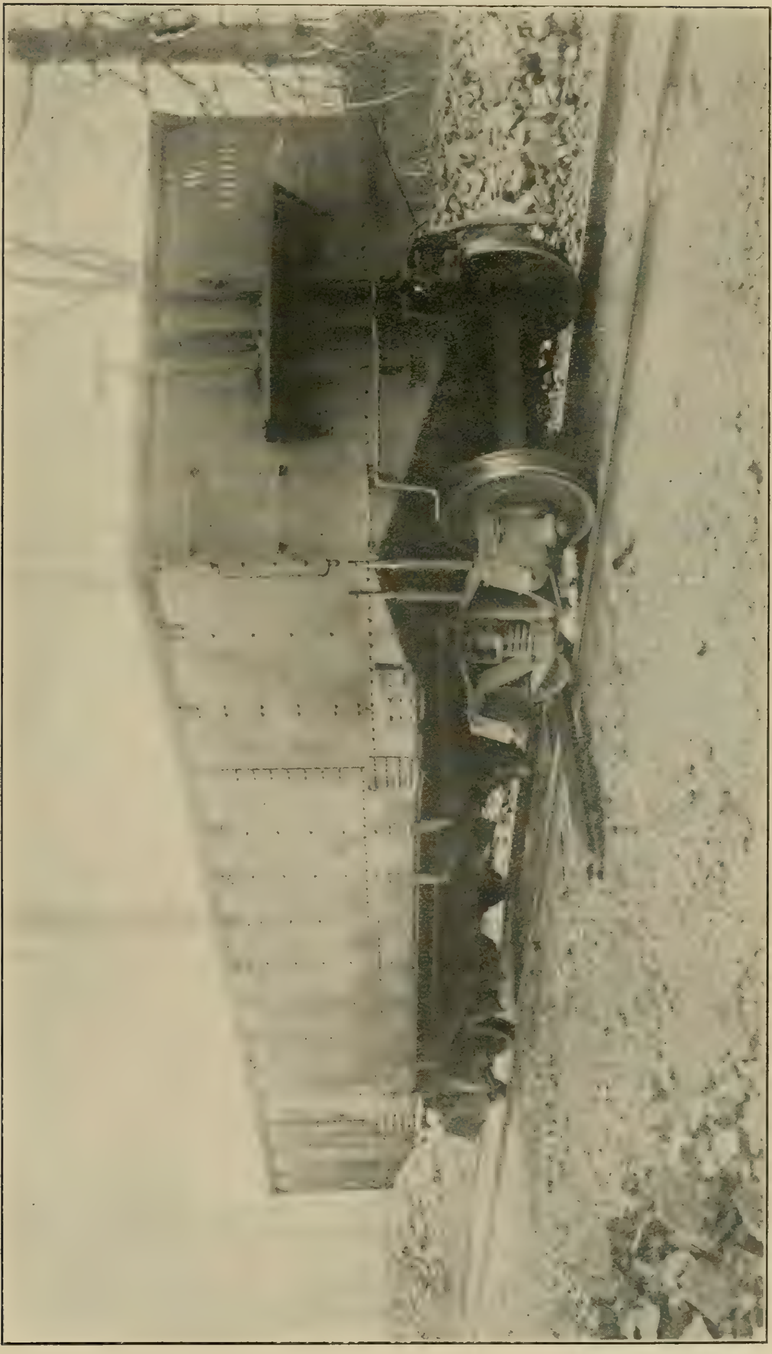


Exhibit E.

car that will only stand a 40,600 pounds buff—or even twice or three times that amount.

The point I am getting at is that a car so designed, which has stood the service this car, and others just like it, have been through for a period of over three years and with no other repairs, I am told, on the body of the car, unless it be a grab iron or something of that sort knocked off from sideswipes—it must be a design that will give good service. And as one part of the paper to-night stated, "we want the lightest cars we can get to stand the work." To build cars of 38,000 to 40,000 pounds that do the work no better than this one, seems to me a useless waste of material. We have heard a great deal lately about misappropriation of funds of insurance companies. I think the railroads, which are owned by the people and which companies have engineers employed to look after their interests in designing cars, should consider it a question of misappropriation of funds when they put into a car 4,000 or 5,000 pounds of material that is actually of no service. Not only the first cost of this material is wasted, but with this dead load the revenue from perhaps two or two and a half tons is lost. This latter item is the greatest of all.

Before establishing a draft rigging standard for this particular type of car, we should first determine **what part of the car is resisting the stresses that must pass through it from the immense buffing shocks.** I made the point the other time I was before this Club that the center sills of all steel gondola cars do not transmit anything like all the stresses when the car is under the vertical load. It is my opinion that very little of it passes through the center sills. I have made some tests since reading that paper, which, however, have not gone far enough to fix definitely the conditions I claim exist. But one test made by me was on a Penna. G. S. car, the number and initials of which I can give if desired. It was loaded with 120,000 pounds of iron ore, after having placed on it an extensometer which would indicate the elongation or contraction in the length of a member. This extensometer was applied to the center sill, 1¾" below its top, and extended from bolster to bolster.

When the load was applied the finger pointer of the extensometer moved along the dial and indicated that the top part of this center sill had stretched out longer. The car was run perhaps a mile or two and the load shoveled out, and the finger came back to zero again, indicating that with the removal of the load the tension which pulled the center sill out longer was relieved. The extensometer could not show all of the tension, as the vertical load on this shallow member would deflect it, also because the steel measuring wire of the extensometer being stretched on a straight line would not show the results of the curve due to that deflection. This is a subject that needs further experiment.

My building this car without center sills was brought about by being forced to leave the center sill out in another type of car in order to take care of a very advantageous arrangement of drop doors. And in calculating the stresses in that type of car I came to the conclusion that in the gondola or flat-bottom car the stresses were not transmitted through the center sills.

The facts that these cars have been subject to these buffing stresses for this period of time and have also been subject to hot loads until the side plates have bulged in many places and have been in a wreck where they must have sustained from 400,000 to 500,000 pounds' shock, indicate to me that careful mathematicians who have made public statements about my type of a car before they knew it existed and had been through such service, and who have not come out and publicly confessed or agreed that the car could stand such a stress, all of this convinces me that the subject is not fully understood.

In the construction of a gondola car it must necessarily have deep sides in order to form a retaining wall for the granular material. These sides of the car form very convenient members for transmitting the vertical load. It is the most economical member that the car possesses and if it can be found that this vertical load is carried by the sides of the car and it is also able to transmit the maximum longitudinal stresses and endwise shocks without materially increasing the weight of the structure over that required for carrying the vertical load, due to the happy fact that the buffing shocks produce compression in the lower portion of this girder and the vertical load produces tension in this lower portion, one counteracting the other, and in transmitting these buffing shocks when the car is empty it has been found that a very little material need to be added to the bottom of the car side, thereby producing a very light car of large capacity and one that will transmit these shocks and do it safely.

Now I have been criticised for constructing these cars with the side stiffeners on the inside—(I do not call them stakes)—stakes were handed down from the old wooden car construction as a support for the sideboards, but in steel car construction I think we should follow the engineering practice used by our railway bridge engineers in the construction of through plate girders. The bridge department of our American railroads have the best engineering talent to be found anywhere in the world. I am told that a car differs from a bridge materially in that it is subject to all kinds of stresses, sidewise, up and down, lengthwise and twisting stresses. But I have found in this example that this construction serves admirably for gondola car service. The practice of putting these stiffeners on the outside where they are subject to damage from sideswipes is, I think ,erroneous. You who have noticed steel cars have seen these outside stiffeners plasterd down on the side of the car, reminding one of apple butter spread on a piece of gingerbread. In this condition they are of little or no service as a stiffener to sustain the side girders either against buckling or against the outward movement due to the pressure of the load. With inside stiffeners the question which has been put up to me a number of times as to their being injured by shifting loads, has not materialized. These cars have been in service this length of time and the stiffeners have not been moved or bent over. Moreover, if they were bent over they would not be plastered down, and the action of the load pressing outward, putting tension on the stiffeners, would tend to straighten them out, and they are therefore not destroyed for the purpose for which they were designed; and therefore, even if injured, they are still a material assistance to the girder for holding it in the position in which it is able to carry the load. When the side girder is held in a vertical position, causing the top or compressing member of the girder to be held in a straight line, the lengthwise forces traverse it without any material action toward deflecting it laterally. But with the girder buckled, as shown in the numerous examples I picked up on so short notice (and it was no trouble to pick them up, for there are many of them), with the **compression forces** and the **endwise forces** due to **buffing shocks** added together, this **buckling continues** until the girder fails and the **Car Is A Failure.**

You must not understand, however, that because of my ability to find these numerous examples of failure in this type of car that they represent any considerable portion of the steel cars in use. On the contrary, their percentage of the whole is very small; they do, however, serve as an example wherein attempts were made at reduction in weight which has caused failure, and my whole effort here to-night is to show that these failures are due primarily to a weak construction of the side girders and ultimately to the effect of end shocks.

I think I have taken enough of the time and I thank all of you for your careful attention. I would like to hear others tear this argument to pieces and show me where I am wrong.

PRESIDENT: It seems to be up to the car designers who have not adopted the Summers method to explain, and we would like to hear from Mr. Harvey Allen, assistant mechanical engineer, Pressed Steel Car Co.

MR. ALLEN: As this is my first visit and I am not yet a member of the Club, I would like to be excused.

PRESIDENT: We have men here who possibly cannot go into the office and make the pictures, but they have to correct the mistakes that are made in the office, on the repair tracks. I will call on Mr. Watts, of the Monongahela Connecting R. R.

MR. H. W. WATTS: The experience which I presume the president alludes to is not directly in line with the subject, that is it does not affect the buffing strains of a car, but the strains which come from the load. As some of you know, we have cars which were designed to hold loads at a speed not exceeding six miles per hour, of 100 tons, 200,000 lbs. They held up under 200,000 lbs. until the parties loading them conceived it to be necessary to place the load in the middle of the car. Then they didn't hold up. Deflection took place at the lower suspension member and the compression member buckled. We took them into the shop several times and straightened them out and put them into service. We found they would buckle under a load of 160,000 lbs. when loaded in the center. After consultation with Mr. Stucki, who designed them, and our own mechanical engineer, we decided to straighten them by applying to the upper edge a 5 x 5 x ½″ angle iron. Since that time those cars have been loaded with such loads as 225,000 and 272,000 lbs. and run, I should say, about a mile over our tracks to the stock house and are there unloaded. They stood up under such loads, with of course a slight deflection under load which as soon as the load was removed disappeared, showing no permanent strain or deflection.

PRESIDENT: Mr. Gies, you have your troubles; we would like to hear from you.

MR. GEO. E. GIES: Mr. Turner and Gentlemen: I haven't gone into this matter far enough to say anything to-night, but I would like to ask Mr. Summers whether the irregular top on some of these G. S. cars was not due considerably to the unloading machines they have at the docks. I know we have had quite a number of G. S. cars that have shown that, caused as I believe by nothing else than the handling of the cars by the unloading machines.

MR. E. W. SUMMERS: Mr. President, that is a matter I overlooked a while ago. The matter of taking care of just such forces as that has occurred to me before, and in order to take care of it I will show how the top flanges of the cars I have had in service for three and a half years, and the top flange of an ordinary car compare. I am aware that there are a number of different types of top flange.

See Exhibit G. This I have shown is a ¼″ web plate, with a 3 x 3 x ⅜″ angle, illustrating the top edge of the ordinary car side, and the other is a quarter inch plate bent around, forming the top flange on my car. This particular form was referred to by one of the parties in the discussion of my paper two years ago, as a sort of a question. My answer to that to-night is that it is a backbone, and it is placed in the right part of the anatomy of a car for a backbone, and it is a backbone that is wide enough and deep enough to resist the strains that are brought about by unloading machines. My experience in de-

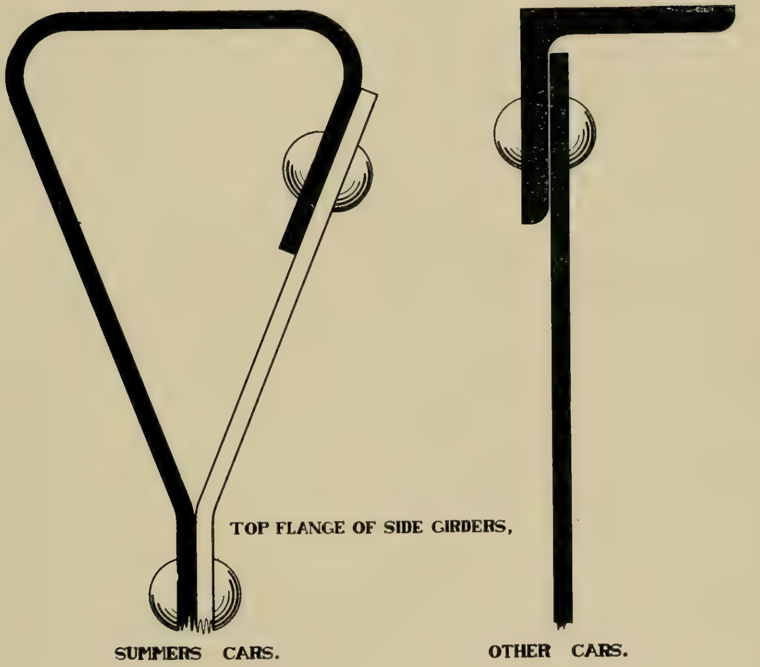
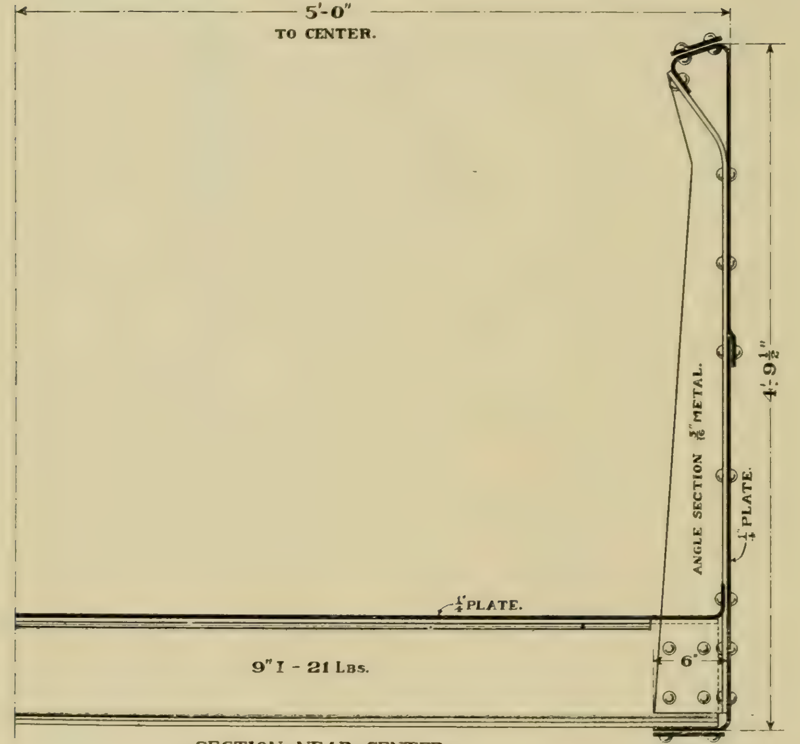


Exhibit G.

signing unloading machines, a number of which I had in charge, caused me to do this in the first cars I built. The weight of the material in the two sections shown in exhibit G are almost exactly the same.

The question of making a wide and rigid top or compression member on a plate girder is looked upon as necessary by all engineers, and in the case of a side girder in a car that has to resist lateral forces due to retaining the load, it must be assisted for the reason that to make a member wide enough to resist this force for a distance of 30 or 40 feet would make it so wide that it would take up a lot of the room from the load.

This next exhibit, which I call H, shows the method I employed in my cars that are in service. An angle iron shaped inner member placed flat up against the web of a cross floor beam with a sufficient number of rivets acting in direct shear, so as to resist this lateral stress, and attached to a member which is able to hold it, that is the floor beam, and in this case



SECTION NEAR CENTER.

EXHIBIT H.

I put it clear across the car from side to side, the simplest form of construction. That enables me to support the top of the car at intervals, and with the top made sufficiently wide and heavy it has been found to resist all the stresses the car has been subject to.

I do not think that the zig-zag in the top of the cars exhibited is due in all cases to unloading machines, though it may be in some of them. But as in some cases the members are pushed out and in others in, it would indicate that it could not be from the unloading machines.

PRESIDENT: Mr. Stark, you have some trouble with weak cars.

MR. F. H. STARK: I do not feel competent to talk on this subject. I feel grateful to the author of the paper fo having stated that the railroads and car builders have given the question of theoretical design some consideration. I believe he is the first mechanical engineer that has ever given the railroads that much credit. I was surprised to learn that the cross sectional area of the center sills approximated so closely the cross section of the coupler shank. In view of this I believe it would be well to increase the capacity of the center sills above that of the coupler. We should have that as a sort of a fuse block, as it were; if something has to let go, let it be the least expensive member.

Our friend Mr. Summers resembles very closely the merchant, who could not talk very effectively without the use of his hands, and I will assure you that there is no one present that can hold his hands.

The question of utilizing the floor sheets as a buffing resistance might do for a time, but we all know that after a car has been in service six or eight or ten years we cannot count much on the floor sheets. Corrosion will take place and buckling will take place, and two or three years' service will not prove the subject. There is no question but that we must depend very largely upon the backbone of the car—though I believe the bone may be in the belly of the car. The Penn'a. R. R. has made a study of that subject, and they find that they must provide center sills that are almost indestructible. We cannot expect to distribute the shocks through the side sills of the car.

Designers do the best they can. and there is no question but that other causes contribute to the failure of the sides of the cars in addition to end shocks.

PRESIDENT: Mr. Carson, you have had some experience.

MR. G. E. CARSON: Mr. President, this discussion is very interesting, and it is a question in my mind as to whether a car should have a backbone or not. We know, and our experience has taught us in the nature of the repairs we make on our repair tracks, that the weak point is certainly in our center sills. That is the source of most of our troubles. And in looking over Mr. Summers' pictures here, the majority of the troubles are due, apparently, to unfair usage. We draw in the sides of the car by dropping the floor. Some of the gondolas have the sides pushed out, due to having at one time been loaded with overhanging loads. But there is a class of cars 40 feet in length that the sides do bulge on us, and that is due to weak center sills. I believe that the car companies should give that greater consideration, because they are certainly not standing up.

PRESIDENT: Are there any others who would like to talk? If not, I will invite Mr. Stucki to close the discussion.

MR. A. STUCKI: The subject this evening covers three points. The first question was "Should we have a standard?" Judging from the fact that the discussion did not touch this point at all, indicates, I think, that there is no objection to such a standard.

The second question is "What should the basis of such a standard be?" I am yet inclined to think that a certain fibre stress for a certain specified shock is the proper basis for the strength of a car lengthwise, as by this plan all specifications could be made to read practically alike, as far as this point is concerned; while, if a certain cross sectional area of the underframe would be considered, every type of car would have to be specified differently. I would have very much liked to hear the opinion of some of the members present on this point.

The third question was "What end shock should we consider as a basis?" Mr. Reese has mentioned that with their new dynamometer car they have registered as high as 400 and 500,000 lbs., and if I understand him right, he thinks that we should provide for greater shocks than indicated in the paper. On the other hand we dare not forget that the figures mentioned represent very severe cases.

In regard to the spreading of the cars, brought up by Mr. Summers, I may say that I personally believe in a strong member along the top edge of the car, not as a backbone, but to prevent the car from getting out of line. I also would prefer rolled shapes, such as angles, channels and bulb angles over a pressed sheet, so as to facilitate repairs. I also think it economical, if necessary, to run one member from end to end of car, and a reinforcing member between the body bolsters.

Such deformations of the car top are often due to excessive loads, as brought out by Mr. Watts; often the trouble is occasioned by the load being supported by the top edges or by the unloading machines, as mentioned by Mr. Gies and Mr. Carson, and as long as we are using cars, we will have to look for more or less damages of this nature. The percentage of such cases is already very small, even Mr. Summers agrees on that point, and it is reasonable to assume that continued watchfulness in designing will reduce the percentage of such damages to an almost negligible quantity.

In regard to Mr. Summers' specific car construction, possibly the most distinguishing feature is the absence of center sills. In the evolution of the steel car, as Mr. Stark rightfully calls it, a tendency existed for some time and is now stronger than ever, to make the center sills heavier, not so much to carry the load, as to save the car from punishment lengthwise, and the discussion has brought out that on long cars the sides bulged on account of the center sills being too weak. This tendency has been brought about by experience gathered during the last eight years, and by watching the performance of the steel cars, several hundred thousand of which are now in use. As a result of this study, the railroads consider it necessary to pursue this course, to get a safe, lasting and economical construction, and to disregard all this experience and to leave off the center sills would undoubtedly be a serious step.

It is true Mr. Summers for the last three or four years has had in continuous service two hopper and two gondola cars, three of which apparently held out very well, while one gondola car was damaged in a slight wreck. On the other hand, we know that it is much easier to watch three or four cars, kept in special service, than to keep track of thousands in regular service. At any rate it would be manifestly unwise to set aside the experience above alluded to.

Mr. Summers takes exception to a previous statement of mine regarding his gondola cars, and especially in regard to its strength lengthwise. He apparently misunderstood said statement. It was based, as is customary in designing, on a formula, which provides for the proper safety. This formula has been giving very good results for the designing of plate girders for years and is undoubtedly much older than the steel car industry itself. It can be found in the Carnegie Pocket Companion. There is no evidence that this formula is wrong. Supposing a factor safety of 5, such as commonly used in ordinary steel, would mean that said car at the point of rupture would take 5 x 40,600 or 203,000 lbs. empty. It is also evident that this figure would run up very much higher when loaded, and there is no evidence that the car in question received such blows; on the contrary, from the report of the committee, mentioned in the paper, and assuming ordinary handling, we can reasonably expect that occasional shocks of only 150,000 lbs. have occurred. I also understand that the two cars in service had additional stiffeners underneath the floor sheets, while the car design, to which the above statement refers, had the end floor sheets unsupported.

In regard to the other gondola car, the one that was in the wreck, I previously understood from Mr. Summers that the end was forced in around the coupler. However that may be, it is plain that the first car took the blow. It was an excellent cushion, first, because it was weak, and, secondly, it was loaded, and had it had a strong center sill to transmit the shock, instead of letting the body and the load slip forward, we might have had a better test of the steel construction in question. It will also be remembered that the steel car was loaded, thereby bucking the end sheet considerably. Generally speaking, it is misleading to judge the strength of a steel car by its behavior with a wooden car.

PRESIDENT:—This will close the discussion.

I neglected one matter. Since our last meeting we have lost two of our members by death, Mr. J. C. Hyde, formerly Superintendent of the B., R. & P., and Mr. Frederick Schuchman, president of the Homestead Valve Co. In accordance with our custom I will appoint as committees to draft suitable resolutions, for Mr. Hyde, Messrs. F. T. Hyndman, J. W. Riley and Stephen C. Mason, and for Mr. Schuchman, Messrs. E. W. Summers, George Gies and A. W. Slocum.

If the Committee on Nominations is ready to report we will hear from them.

MR. D. M. HOWE: Your Committee appointed to select a list of names for nomination for officers of this Club for the ensuing year beg leave to submit the following:

For president, one to elect:
- D. F. Crawford,
- F. H. Stark.

For first vice president, one to elect:
- F. H. Stark,
- D. J. Redding,
- D. F. Crawford,
- F. R. McFeatters,
- H. W. Watts,
- W. J. Buchanan.

Second vice president, one to elect:
- Geo. T. Barnsley,
- G. P. Sweeley,
- E. B. Gilbert,
- W. J. Buchanan,
- D. J. Redding,
- M. A. Malloy.

Executive Committee, three to elect:
- F. R. McFeatters,
- J. F. Prendergast.
- Robert H. Blackall,
- G. P. Sweeley,
- G. E. Carson.

Finance Committee, three to elect:
- H. B. Ayers,
- R. Evans,
- Chas. Lindstrom,
- J. M. Hansen.

Membership Committee, five to elect:
- A. M. Schoyer,
- Stephen C. Mason,
- Robert H. Blackall,
- R. A. Bole.
- J. B. Safford.
- A. B. Bellows.

Secretary, one to elect:
- J. D. Conway,
- C. V. Wood.

Treasurer, one to elect:
- J. D. McIlwain,
- J. L. Hukill.

Through the courtesy of the Pittsburgh Coal Co. and The Pittsburgh and Lake Erie Railroad Co., the Club members, their wives and guests, were taken to the Imperial County Fair by special train to Imperial, Pa., in the afternoon. Free tickets of admission to the Fair grounds were provided by the Coal Co. and they also had arranged an old fashioned chicken dinner, which was served on the lawn of the mine superintendent at Imperial in the evening. Addresses were delivered by several gentlemen present and it was voted by all that it was an afternoon well spent.

MR. D. M. HOWE: I was particularly requested by the ladies who accompanied us this afternoon to extend their sincere thanks to the officials of the Pittsburg Coal Company and to the P. & L. E. R. R. for the very kind manner in which they were taken care of this afternoon, and in particular do they request that their thanks be extended to dear Mr. Riley, whom they speak of so highly, who did his part of the work so kindly and efficiently.

I would make that as a motion, to be spread upon the minutes.

The motion being duly seconded was carried unanimously.

PRESIDENT: On behalf of the Club I will appoint Mr. Howe to say to the ladies that it is a pleasure always to have them with us.

ON MOTION, Adjourned.

Jed C. Hyde.

Our Almighty Father, in His infinite wisdom, has removed from among us our fellow member of the Railway Club of Pittsburgh,

MR. JED C. HYDE,

who died suddenly at Butler, Pa., August 21st, 1905; therefore, be it

Resolved, That in his death, not only the Railway Club of Pittsburgh, but this community, has sustained a great loss. He was a person most admired by those who knew him best, being endowed with sterling integrity, a noble, generous nature, and a true friend of all needing sympathy or assistance;

Resolved, That we extend to his sorrowing family our sincere and heartfelt sympathy in this the greatest of all afflictions; and be it further

Resolved, That these resolutions be spread on the minutes of this Club and a copy of same presented to the family.

F. T. Hyndman,
J. W. Riley,
Stephen C. Mason,
Committee.

Frederick Schuchman.

Whereas, Death has taken away from among us one of the active members of this Club, through the demise of

FREDERICK SCHUCHMAN;

and

Whereas, The said Frederick Schuchman was known for his generosity, kindness of heart and manly characteristics; it is, therefore,

Resolved, That the Railway Club of Pittsburgh present to the bereaved family an expression of its sympathy and condolences in their time of sorrow.

A. W. Slocum,
George E. Gies, } Committee.
E. W. Summers,

EDWARD KERR, President. ESTABLISHED 1891 W. R. BROWN, Treas. and Supt.

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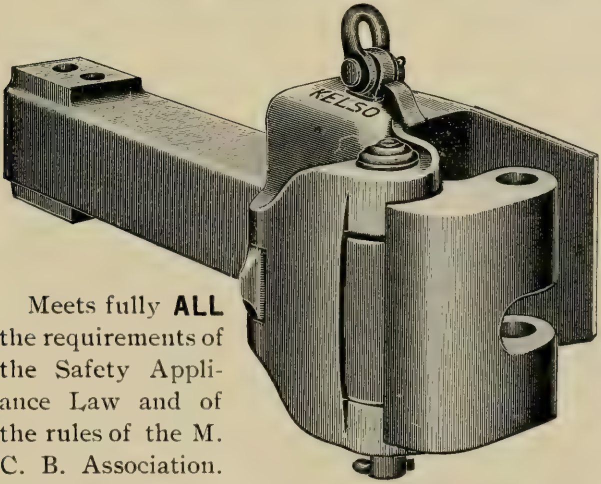

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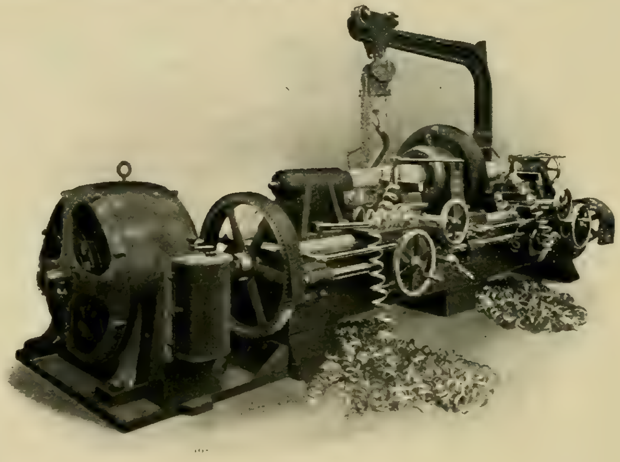

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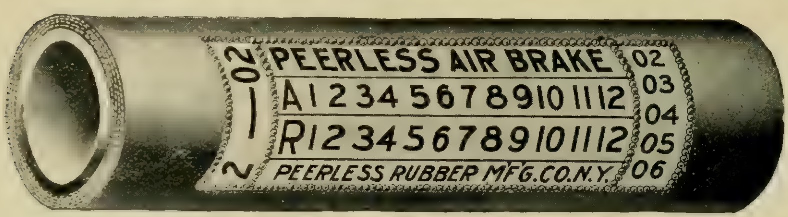
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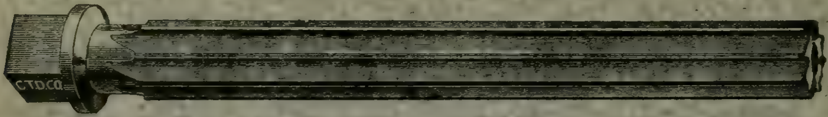

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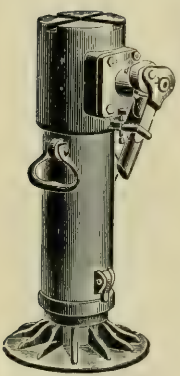
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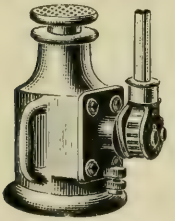
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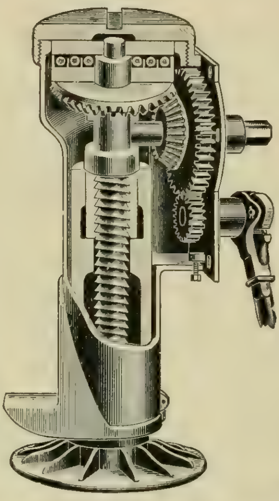
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of the
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ORGANIZED OCTOBER 18, 1901.

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Supt. Motive Power, P. & L. E. R. R., Pittsburgh, Pa.

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Treasurer,
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Sales Agent, J. D. McIlwain & Co.,
Pittsburgh, Pa.

Secretary,
J. D. Conway,
Chief Clerk, Supt. M. P., General Offices P. & L. E. R. R., Pittsburgh, Pa.

Executive Committee,

E. M. HERR,
Gen'l Manager Westinghouse Air Brake Co.,
Pittsburgh, Pa.

F. H. STARK,
Superintendent Rolling Stock, Pittsburgh Coal Company, Coraopolis, Pa.

VOL. IV.
No. 9.

Pittsburgh, Pa., Oct. 27, 1905.

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Published monthly, except June, July and August, by the Railway Club of Pittsburgh,
J. D. Conway, Secretary, General Offices P. & L. E. R. R., Pittsburgh, Pa.

Meetings held fourth Friday each month, except June, July and August.

PROCEEDINGS OF ANNUAL MEETING,
OCTOBER 27th, 1905.

The meeting was called to order in the Assembly Room of the Monongahela Club, Pittsburgh, Pa., at 8:30 o'clock P. M., with President L. H. Turner in the chair.

The following gentlemen registered:

MEMBERS.

Allen, Harry L.
Allen, James P.
Ayers, H. B.
Barney, H. E.
Barnsley, Geo. T.
Bealor, B. G.
Blackall, Robert H.
Blest, M. C.
Bole, Robt. A.
Bowery, Frederick.
Brady, D. M.
Brand, Thos.
Brittain, Jno. B.
Brown, E. W.
Brown, Geo. P.
Brown, John T.
Bruner, E. F.
Carson, G. E.
Chittenden, A. D.
Conway, J. D.
Cottrell, W.
Courtney, D. C.
Cunningham, J. D.
Davis, E. E.
Day, Edward B.
Decker, Omar S.
Dreyfus, T. F.
Foller, Chas. S.
Frank, Laurence W.
Gies, George E.
Giesey, V. A.
Gormen, T. F.
Grewe, H. F.
Grooms, J. C.
Haas, Ben.
Haynes, J. E.
Hempsted, J. G.
Henderson, J. W.
Herr, E. M.
Ludgate, B. A.
Lynn, Samuel.
Madden, W. E.
Mason, Stephen C.
Melson, Wm. C.
Michel, Wm. J.
Miller, Ira H.
Miller, M. M.
Moore, A. F.
Murphy, W. J.
McCaslin, A. W.
McConnell, C. H.
McCrea, A. M.
McDonnell, F. V.
McIlwain, J. D.
McVicar, G. E.
Neilson, G. H.
Newman, T. E.
Noble, D. C.
Oates, Geo. M.
Orr, J. W.
Palmer, Chas. A.
Platt, A. T.
Pogue, Robert.
Porter, H. V.
Post, Geo. A.
Pratt, H. A.
Quest, F. E.
Quest, W. O.
Redding, D. J.
Reese, E.
Reed, James.
Rhodes, Geo. P.
Richardson, W. P.
Riley, Geo. N.
Riley, J. W.
Safford, J. B.
Sattley, E. C.
Schomberg, Wm. T.

Hobson, J. S.
Hoffman, N. K.
Howe, D. M.
Hughes, J. E.
Hukill, J. L.
Humphrey, A. L.
Huyett, E. G.
Jackson, M. R.
Jefferson, E. Z.
Kelly, Moore.
Kessler, D. D.
Kinter, D. H.
Knight, E. A.
Krause, Julius.
Lanahan, Frank J.
Lanfersiek, Jno. F.
Laughlin, C. W.
Lawson, Sherman S.
Lee, L. A.
Lindstrom, Chas.
Lobez, Pierre L.
Long, Prof. J., Henry.
Scull, J. W.
Sherman, C. W.
Shupe, C. W.
Smith, D. W.
Smith, Ross W.
Stark, B. F.
Stark, F. H.
Strattan, G. W.
Suckfield, G. A.
Swann, J. B.
Sweeley, Geo. P.
Tate, Ralph H.
Taylor, J. W.
Townsend, T. E.
Tracy, M. S.
Turner, L. H.
Vankirk, T. F.
Warnock, H. R.
Wells, M. E.
Wendt, Edwin F.
Whitney, Louis B.
Woodside, S. P.

VISITORS.

Alleman, C. W.
Bixler, A. P.
Coen, P. A.
Davidson, Clifford P.
Glasser, Chas. H.
Hamnett, Jas. H.
Henry, J. B.
Jack, Boyd S.
Kelly, J. P.
Kennedy, E. H.
Kimber, H. D.
Leach, W. B.
Millar, Clarence W.
Rauch, T. T.
Rodgers, Judge Elliott.
Slemmer, J. C.
Terrell, C. D.
Walsh, Charles E.

PRESIDENT: The minutes of the last regular meeting are now in the hands of the printer, and if there are no objections, they will stand approved.

Secretary J. D. Conway read the following list of applications for membership.

Eberhart F. Bruner, Ass't Chief Clerk to M. M., B. & O. R. R. Co., 710 Carson St., Pittsburgh, Pa.
P. Cofrode, Master Carpenter, P. R. R. Co., Room 217, Union Station, Pittsburgh, Pa.

A. F. Coulter, Gen'l Car Foreman, B. & O. R. R., 226 Elizabeth St., Pittsburgh, Pa.
E. E. Davis, S. M. P., B., R. & P. Ry. Co., Du Bois, Pa.
B. W. Duer, Supt., B. & O. R. R., B. & O. Station, Pittsburgh, Pa.
O. E. Farnan, Ass't Train Master, B. & O. R. R., 4631 Second Ave., Hazelwood, Pittsburgh, Pa.
M. A. Garrett, V. P., Farlow Draft Gear Co., 1203 Monadnock Block, Chicago, Ill.
R. F. Hayes, Western Rep., The Curtain Supply Co., 93 Ohio St., Chicago, Ill.
John L. Holpp, Ass't Foreman, B. & O. R. R., 330 Johnston Ave., Pittsburgh, Pa.
A. L. Humphrey, Gen'l Mgr., W. A. B. Co., Wilmerding, Pa.
D. F. Hurd, Gen'l Agt., L. S. & M. S. Ry. Co., Park Building, Pittsburgh, Pa.
W. C. Johnston, Gen'l Mgr., Monongahela Iron & Steel Co., P. O. Box 215, Pittsburgh, Pa.
G. H. Judy, Foreman Blacksmith, B. & O. R. R., 1512 Franklin St., Allegheny, Pa.
Wm. V. Kelley, Pres., American Steel Foundries, Chicago, Ill.
J. K. Kerr, Gen'l Yard Master, M. C. R. R., Second Ave. (Near Bates St.), Pittsburgh, Pa.
Prof. John Henry Long, Demonstrator and Lecturer, 510 Sandusky St., Allegheny, Pa.
A. G. Mitchell, Supt., P. R. R., 3000 Sarah St., Pittsburgh, Pa.
Jas. G. Mowry, Railway Rep., Patton Paint Co., Newark, N. J.
H. W. McMaster, Gen'l Supt., Wabash-Pittsburgh Terminal Ry. Co., Pittsburgh, Pa.
Thos. E. Newman, R. F. of E., B. & O. R. R., 5316 Gertrude St., Pittsburgh, Pa.
W. W. Peacock, Machinery Salesman, Baird Machinery Co., Pittsburgh, Pa.
Wm. R. Pitt, Chief Clerk, B. & O. R. R., Glenwood, Pittsburgh, Pa.
A. T. Platt, C. C. to Supt. R. S., Pittsburgh Coal Co., Coraopolis, Pa.
W. M. Prall, Commissioner, Pittsburgh Car Service Association, Room 418 Westinghouse Bldg., Pittsburgh, Pa.
John R. Roberts, C. C. to Gen'l Supt., Monongahela Connecting R. R., Second Ave. (Near Bates St.), Pittsburgh, Pa.

J. W. Scull, P. A., Pressed Steel Car Co., Pittsburgh, Pa.

Jas. L. Smith, Ass't Foreman, Penna. Co., Grand Ave., 15th ward, Allegheny, Pa.

H. L. Spear, Foreman Cabinet Maker, B. & O. R. R., Glenwood, Pittsburgh, Pa.

Chas. S. Steinmeyer, Ass't C. C. to Gen'l Supt., Monongahela Connecting R. R., 4736 Wallingford St., Pittsburgh, Pa.

C. B. Piercy, Engr. of Const., Pressed Steel Car Co., McKees Rocks, Pa.

Harvey A. Allen, Asst. to Mech. Engr., Pressed Steel Car Co., McKees Rocks, Pa.

Frank J. Lanahan, Sec. & Treas. Fort Pitt Mall. & Grey Iron Co., Pittsburgh, Pa.

J. K. Yohe, Air Brake Inspector, P. & L. E. R. R. Co., 232 Charles St., Pittsburgh, Pa.

W. W. Stewart, Draftsman, B. & O. R. R. Co., Glenwood, Pittsburgh, Pa.

E. M. Wageley, Foreman Planing Mill, B. & O. R. R. Co., 2032 Lytle St., Pittsburgh, Pa.

S. R. McGary, Tool Steel Expert, Johnson-Peter Co., House Bldg., Pittsburgh, Pa.

Paul M. Collier, C. C. to Asst. to V. P., Pressed Steel Car Co., McKees Rocks, Pa.

Ralph H. Tate, Sales Agent, Monon. Casting Co., 505 Preble ave., Allegheny, Pa.

A. G. Sandman, Chief Draftsman, B. & O. R. R., Mt. Clare, Baltimore, Md.

James Reed, Civil Engr., Pressed Steel Car Co., McKees Rocks, Pa.

Stephen Y. Baldwin, Com. Frt. Agent., D. & H. Co., Bessemer Bldg., Pittsburgh, Pa.

PRESIDENT: As soon as these names have been favorably passed upon by the Executive Committee the gentlemen will become members.

At our last regular meeting a proposed change in our Constitution and By-Laws was read and we are now ready to act upon it.

The proposed amendments having been read by the Secretary, UPON MOTION they are adopted.

The Annual Reports of the Secretary and the Treasurer were then read by Secretary Conway, as follows:

SECRETARY'S REPORT.

As we have now reached the fourth year since the organization of our Club, and following custom, your Secretary may be permitted to briefly summarize the events of the year, which in the main cannot be otherwise than pleasing:

Our Club has had a steady growth in membership. Last year we had 510 members, and as will be noted in the summary following we now have 632 members, or a gain during the year of 122.

Our attendance at the meetings has increased at least 25 per cent, and the papers presented were of especial interest, which no doubt is largely responsible for the increased attendance.

The Standing Committee of our Club on Revision of the M. C. B. Rules have again distinguished themselves by presenting a report which was very largely adopted by the Master Car Builders' Association, at the June Convention, held at Manhattan Beach this year.

Death removed from our midst the following members during the year.

E. R. de Grain, died October 25th, 1904.
Jas. M. Ritchie, died December 19th, 1904.
C. L. Gist, died April 2nd, 1905.
Mark McDaniel, died April 8th, 1905.
Frederick Schuchman, died July 25th, 1905.
J. C. Hyde, died August 21st, 1905.
J. D. Smith, notice not received.
S. D. Evans, notice not received.

Our friends, the advertisers, have treated us generously, which makes it possible for us to meet our expenses, and is certainly the fuel that throws the light ahead, keeps the drivers moving, supplies the tonnage and prevents the dispatcher from finding it necessary to sidetrack us, as we feel capable of doing the lubricating and looking after the right of way. I am certain, gentlemen, you join with me in extending to this strong influence in our welfare a hearty vote of thanks.

The following is a summary of the membership, financial condition, etc., for the year ending October 27th, 1905, or up to this meeting:

MEMBERSHIP.

Reported last year	510	
Received into membership	161	671
Suspended, non-payment of dues	12	
Resigned	15	
Loss of address	4	
Removed by death	8	39
Present membership		632

FINANCIAL.

RECEIPTS—

In hands of Treasurer last year	$1,199.66	
From advertisers	1,421.44	
From dues	1,494.00	
From sale of Proceedings	3.00	$4,118.10

DISBURSEMENTS—

Printing, proceedings, advance sheets and notices	$1,213.80	
Hotel, luncheon, etc.	646.40	
Postage for journals and correspondence	179.49	
Secretary's trip to Manhattan Beach	50.00	
Assessment, Society Ry. Club Secretaries	10.00	
Salary, secretary year 1903-1904	500.00	
Binding Proceedings	35.00	
Reporting Proceedings	135.00	
Cigars for meetings	62.26	
Entertainment	142.00	
Stationery and supplies	74.50	
Miscellaneous	26.98	3,075.43
Balance in hands of treasurer		$1,042.67

Approved: J. D. CONWAY, Secretary.
E. M. HERR,
F. H. STARK,
Executive Committee.

TREASURER'S REPORT.

Report of Treasurer for the Year Ending October 27th, 1905.

Balance on hand last report	$1,199.66	
Received from secretary	2,918.44	$4,118.10

Paid out on Sec't checks.........	3,075.43	
Balance on hand Oct. 27th, 1905..	1,042.67	4,118.10

J. D. McILWAIN, Treasurer.

Approved:

E. M. HERR,
F. H. STARK,
Executive Committee.

PRESIDENT: I don't know but that it would be appropriate to say that we have a Napoleon of finance in our Secretary. He is the only man I know of who can furnish twelve dollars worth of "crackers and cheese" for three dollars. I don't know why he is so active in getting his amendment through appointing a Finance Committee unless it be that this question of finance is getting on his nerves.

But what shall we do with the reports?

ON MOTION the reports are accepted.

PRESIDENT: I have a communication to read which I know all the members will regret as much as I do.

Pittsburgh, Pa., Oct. 27, 1905.

To the Officers and Members of the Railway Club of Pittsburgh.

Gentlemen:—Since accepting your kind nomination for the Presidency of the Railway Club of Pittsburgh, I find that my time is so much occupied that I fear I could not give your Club the time and attention it deserves. I therefore beg that you will withdraw my name from the list of nominees.

Very respectfully,
D. F. CRAWFORD.

PRESIDENT: The result of the election is as follows; the highest vote for each office only being shown.

FOR PRESIDENT.

F. H. Stark	received	92	votes.

FIRST VICE PRESIDENT.

D. J. Redding	received	70	votes.

SECOND VICE PRESIDENT.

E. B. Gilbert	received	63	votes.

EXECUTIVE COMMITTEE.

F. R. McFeatters	received	190	votes.
G. E. Carson	"	170	"
J. F. Prendergast	"	153	"

FINANCE COMMITTEE.

R. Evans	received	217	votes.
Chas. Lindstrom	”	203	”
H. B. Ayers	”	202	”

MEMBERSHIP COMMITTEE.

A. M. Schoyer	received	235	votes.
R. A. Bole	”	222	”
Stephen C. Mason	”	219	”
J. B. Safford	”	211	”
R. H. Blackall	”	170	”

SECRETARY.

J. D. Conway	received	262	votes.

TREASURER.

J. D. McIlwain	received	186	votes.

PRESIDENT TURNER: As this closes my term as president, I want to take this opportunity of thanking you, every one of you, for the kind and courteous treatment I have invariably met with at your hands.

And now may I introduce to you your new President, Mr. F. H. Stark.

MR. F. H. STARK: Mr. President (retiring) and members of the Railway Club of Pittsburgh: I am at a loss to express my appreciation for the honor conferred upon me, and I am somewhat disappointed that Mr. Crawford has not remained with us. I accepted the nomination of Vice President feeling that I would receive the benefit of the influence and wisdom of an able man like Mr. Crawford for a year. But unfortunately his time will not permit him to accept the office of President.

I want to ask the co-operation of all the members of the Club, for I feel that of myself it would be a failure. I told my friend Mr. Turner that he (personally) would have to continue his active interest in behalf of the Club if I am to succeed him. I will give the Club my best efforts.

MR. E. M. HERR: Mr. President and members of the Pittsburg Railway Club: It is my pleasant duty to-night to say a few words in regard to our retiring President. It needs no eulogy from me to tell you about Mr. Turner's ability in his conduct of the Club, how, being himself not only a charter member but one of the signers of the original call for a meeting to organize this Club, he has served it faithfully on committees, and for two consecutive terms as President. During his presidency the membership of the Club has increased over 50 per cent., and including the long roll of names of applicants for membership which was read to-night has attained an aggregate of 632 members.

It was during Mr. Turner's official term of office that the Permanent Committee on M. C. B. Rules was created, which, as you all know, has scored such a success and obtained such an enviable reputation in the counsels of the Master Car Builders' Association. I need not tell you how ably he has wrought out the purposes of the Club, how well he has conducted these proceedings, and how successfully all that has been committed to his care has been handled by him.

It is with great pleasure, therefore, that I am commissioned to-night on behalf of Mr. Turner's many friends, admirers and co-members of the Railway Club of Pittsburgh, to testify to their appreciation of all his good services toward us and the Club which we all admire and serve, by presenting him with a slight token of their appreciation, which I take great pleasure in now doing.

(Mr. Turner was here handed a magnificent gold watch, chain and charm with diamond setting.)

MR. TURNER: I guess it is not necessary to say that it is wholly unexpected. It is usual to say that, any way. But when you get something of this sort it rather puts you in a place where you can't talk very well. But I thank you all, and I will see you individually about it. I can't tell you any more about it now.

PRESIDENT STARK: We are honored to-night by the presence of two noted gentlemen who have consented to come here and address us for a few moments. And it is my privilege to introduce the first one, who is well known in Pittsburgh, a very popular man indeed, Judge Rodgers.

JUDGE RODGERS gave a very entertaining talk of about 30 minutes' duration.

PRESIDENT: Gentlemen, I am sure we have all enjoyed the remarks made by Judge Rodgers. On behalf of the Railway Club of Pittsburgh I want to say at this time, that we appreciate it very much. It gives me now no less pleasure to introduce to you the Honorable George A, Post, one of the most popular and well known men among railway people. I assure you that you will enjoy his remarks.. Mr. Post.

MR. GEORGE A. POST here gave a very delightful talk interspersed with stories such as he is noted for, and then followed with a glowing tribute to "the man who sells things," which is given herewith in full:

THE MAN WHO SELLS THINGS IS ENTITLED TO A DEGREE.

These are prosperous days in business circles. Printeries and binderies are busy making order books wherein can be entered the tremendous demands for materials of all kinds flowing in to the factories of our country.

What does this prosperity mean in its generic sense? What causes railroads to buy cars by the thousands and locomotives by the hundreds? It means and it is because there have been sales made of all kinds of material entering into the consumption of busy mankind in all quarters of the country.

Sales necessitate transportation, transportation calls for power and vehicles, and so the results of sales ramify into every nook and cranny of civilization.

Sales light the furnace fires, blacken the sky with smoke, set ponderous machinery in motion, quicken the demands for labor, and spread the smile of plenty over the land.

He who sells things is the apostle of happiness, the bulwark of prosperity.

Who fills the hotels, crowds the trains, and loads the freight cars with tonnage? The man who sells things.

Of what commercial value is the most useful and wonderful device that was ever invented, unless it is exploited by the man who knows how to sell it?

Oh, you who pride yourself upon the possession of inventive genius, cudgel your brains, burn the midnight oil, wallow in problems of sky-high mathematics, produce, if you can, something for which you think a waiting world is languishing, and when it is done, unless you get next to a man who can make people believe they need it and sell it to them, your trousers will be frayed at the edges, and your stomach will know the pangs of hunger.

The best friend of everybody is the man who sells things.

He who would sell things must be patient, tactful, broad-gauged, generous, good-natured and tireless. For him no whistle blows to sound the end of his daily toil. For him there are but few peaceful evenings at his home fireside. For him it is hustle, hustle, hustle.

In his travels up and down the highways he seeks audience with and tells his tale to men of varying titles. In the railway trade he goes to presidents, general managers, superintendents of motive power, civil engineers, mechanical engineers, electrical engineers, sanitary engineers, engineers of tests, and in fact runs the gamut of every conceivable degree of titled importance, and, besides, he is ever and always up against that most august personality, the office boy, and to all of these the man who sells things comes under the general characterization of "Drummer" or a "Supply Man," terms that are not intended to dignify and are more or less terms of opprobrium.

Now, I think that after a man has a record of service in selling things, has attended that severest of all schools, namely, contact with the world; after he has been chilled to the marrow by refrigerated receptions; after he has been tried out in the crucible of competition; after he has overcome the mountains of obstacles that beset his path, and "made good." I think he should have a degree conferred upon him.

Our universities are turning loose Doctors, Masters and Bachelors of this and that and the other thing, and Engineers of all kinds and descriptions, to gain which degrees the recipients have undergone not one tithe of the hard work and self-sacrifice of the man who sells things, and have not learned things, and have not learned half as much in the same period of time.

Fit up the most luxurious offices, take a whole floor in the most conspicuous block in Pittsburgh, go out and buy broad acres and erect magnificent works, fit them up with all the most modern machinery and you would never pay the laboring man one cent, the landlord would evict you for the non-payment of the rent of your luxurious offices, if the fellow with the carpet-bag, away from home, plunging through midnight blackness, putting up with all sorts of discomforts, was not sending in his orders so that the wheels might go round and so that a cross-grained auditor might earn his salary by finding fault with the expense account.

Let's give the man who sells things, so that the other fellows with degrees may receive their salaries promptly—a degree.

What shall it be? I confess I am fond of the "Engineer" style. Now, if I remember the definition of an "Engineer" as recorded in the Dictionary, it is not confined to those who have to do only with technical work, but it also calls it "engineering," where one carries through by skill and contrivance a business deal.

What's the matter with calling him a "Commercial Engineer?"

If there is anybody who knows more than the man who sells things about wheels within wheels, slipping a cog, eccentrics, joints, bulldozers, lost motion, making connections, laying pipe, pumping, plugging, and working under high pressure, just trot him out and we will give him a degree that will fit him.

All honor, I say, to the man who sells things. When he is not abroad in the land there is "nothing doing." So sure as the rising sun foretells the coming of the day, so does the appearance of the man who sells things foretell commercial activity, and just in proportion as he succeeds the tide of prosperity ebbs or flows. The man who brusquely turns him down, or who affects to be bored by his presence, or who bars him from his office, does an injustice to the interests confided to his care, and also robs himself of a large amount of information that he needs in his business.

MR. TURNER: After the glowing tributes paid to our retiring and present officers by Mr. Post, it seems appropriate that some of us should acknowledge it by offering a resolution that the Railway Club of Pittsburg extend to Judge Rodgers and to the Hon. George A. Post their sincere thanks for their kindness in coming here and talking to us to-night.

PRESIDENT: It has been moved and seconded that we extend to Judge Rodgers and the Hon. George A. Post our appreciation for their kindness.

The motion being put to vote was carried unanimously.

PRESIDENT: Now, gentlemen, I am satisfied our Secretary, Mr. Conway, has arranged an entertaining program, and we will now turn the meeting over to him for the completion of our entertainment.

SECRETARY CONWAY after a few brief remarks introduced and presented the following entertainers, luncheon, pipes and cigars being presented while the performers had the floor, and within a very few minutes it was clearly demonstrated that the meeting was surely "a smoker."

Piano Selection, - - - - - - Mr. Emerson.

GRAPHOPHONOLOGUE.

Direct from the machine.

1. Marvelous Walton, celebrated hand balancer.
2. Colonial Comedy Four.
3. Prof. Dodds and his famous dog, "Nigger."
4. Prof. Tames P. Dunlevy, in character songs.
5. Mr. Dal Jeffries, champion bag puncher of the world.
6. Mr. Arthur T. Dunlevy, in song and recitation.
7. Prof. James P. Dunlevy, in monologue and recitation.
8. Colonial Comedy Four.

Adjourned.

RAILWAY CLUB OF PITTSBURGH.

CONSTITUTION.

ARTICLE I.

The name of this organization shall be "The Railway Club of Pittsburgh."

ARTICLE II.

OBJECTS.

The objects of this Club shall be mutual intercourse for the acquirement of knowledge, by reports and discussion, for the improvement of railway operation, construction, maintenance and equipment, and to bring into closer relationship men employed in railway work and kindred interests.

ARTICLE III.

MEMBERSHIP.

Section 1. The membership of this Club shall consist of persons interested in any department of railway service or kindred interests, or persons recommended by the Executive Committee upon the payment of the annual dues for the current year.

Sec. 2. Persons may become honorary members of this Club by a unanimous vote of all members present at any of its regular meetings, and shall be entitled to all the privileges of membership and not be subject to the payment of dues or assessments.

ARTICLE IV.

OFFICERS.

"The officers of this Club shall consist of a President, First Vice President, Second Vice President, Secretary, Treasurer, Finance Committee consisting of three members, Membership Committee consisting of five members, and three Elective Executive Members who shall serve a term of one year from the date of their election unless a vacancy occurs, in which case a successor shall be elected to fill the unexpired term."

ARTICLE V.

DUTIES OF OFFICERS.

Sec. 1. The President will preside at all regular or special meetings of the Club and perform all duties pertaining to a presiding officer; also serve as a member of the Executive Committee.

Sec. 2. The First Vice President, in the absence of the President, will perform all the duties of that officer; the Second Vice President, in the absence of the President and First Vice President, will perform the duties of the presiding officer. The First and Second Vice Presidents shall also serve as members of the Executive Committee."

Sec. 3. The Secretary will attend all meetings of the Club or Executive Committee, keep full minutes of their proceedings, preserve the records and documents of the Club, accept and turn over all moneys received to the Treasurer at least once a month, draw cheques for all bills presented when approved by a majority of the Executive Committee present at any meetings of the Club, or Executive Committee meeting. He shall have charge of the publication of the Club proceedings and perform other routine work pertaining to the business affairs of the Club under the direction of the Executive Committee.

Sec. 4. The Treasurer shall receipt for all moneys received from the Secretary and deposit the same in the name of the Club within thirty days in a bank approved by the Executive Committee. All disbursements of the funds of the Club shall be by cheque signed by the Secretary and Treasurer.

Sec. 5. The Executive Committee will exercise a general supervision over the affairs of the Club and authorize all expenditures of its funds. The elective members of this Committee shall also perform the duties of an auditing committee to audit the accounts of the Club at the close of a term or at any time necessary to do so.

Sec. 6. The Finance Committee will have general supervision over the finances of the Club, and perform such duties as may be assigned them by the President or First and Second Vice Presidents.

Sec. 7. The Membership Committee will perform such duties as may be assigned them by the President or First and Second Vice Presidents, and such other duties as may be proper for such a committee.

ARTICLE VI.

ELECTION OF OFFICERS.

Section 1. The officers shall be elected at the regular annual meeting as follows, except as otherwise provided for:

Sec. 2. Written forms will be mailed to all the members of the Club, not less than twenty days previous to the annual meeting, by the three elective members of the Executive Committee. These forms shall provide a method, so that each member may express his choice for the several offices to be filled.

Sec. 3. The three elective members of the Executive Committee will present to the President the names of the members receiving the highest number of votes for each office, together with the number of votes received.

Sec. 4. The President will announce the result of the ballot and declare the election.

Sec. 5. Should two or more members receive the same number of votes, it shall be decided by a vote of the members present, by ballot.

ARTICLE VII.

AMENDMENTS.

Amendments may be made to this Constitution by written request of ten members, presented at a regular meeting and decided by a two-thirds vote of the members present at the next regular meeting.

BY-LAWS.

ARTICLE I.

MEETINGS.

Section 1. The regular meetings of the Club shall be held at Pittsburgh, Pa., on the fourth Friday of each month, except June, July and August, at 8:00 o'clock P. M.

Sec. 2. The annual meeting shall be held on the fourth Friday of October each year.

Sec. 3. The President may, at such times as he deems expedient, or upon request of a quorum, call special meetings.

ARTICLE II.

QUORUM.

At any regular or special meeting nine members shall constitute a quorum.

ARTICLE III.

DUES.

Section 1. The dues of members shall be $2.00 per annum, $1.00 of same to apply to subscription for Club Journal, payable in advance, on or before the fourth Friday of September each year.

Sec. 2. Each member will be assessed $1.00 extra annually to provide light refreshments for each meeting.

Sec. 3. At the annual meeting members whose dues are unpaid shall be dropped from the roll after due notice mailed them at least thirty days previous.

Sec. 4. Members suspended for non-payment of dues shall not be reinstated until all arrearages have been paid.

ARTICLE IV.

ORDER OF BUSINESS.

1—Roll call.
2—Reading of the minutes.
3—Announcements of new members.
4—Reports of Committees.
5—Communications, notices, etc.
6—Unfinished business.
7—New business.
8—Recess.
9—Discussion of subjects presented at previous meeting.
10—Appointments of committees.
11—Election of officers.
12—Announcements.
13—Financial reports or statements.
14—Adjournment.

ARTICLE V.

SUBJECTS—PUBLICATIONS.

Section 1. The Executive Committee will provide the papers or matter for discussion at each regular meeting.

Sec. 2. The proceedings or such portion as the Executive Committee may approve shall be published (standard size, 6x9 inches), and mailed to the members of the Club or other similar clubs with which exchange is made.

ARTICLE VI.

The stenographic report of the meetings will be confined to resolutions; motions and discussions of papers unless otherwise directed by the presiding officer.

ARTICLE VII.

AMENDMENTS.

These By-Laws may be amended by written request of ten members, presented at a regular meeting, and a two-thirds vote of the members present at the next meeting.

Members.

Aikins, Jos. K.,
Chief Clerk to Supt.
Pennsylvania R. R. Co.,
30th and Sarah sts., S. S.,
Pittsburgh, Pa.

Alexander, J. R.,
Air Brake Inspector,
Pennsylvania R. R. Co.,
Altoona, Pa.

Allen, Harry, L.
Asst. Dist. Manager,
American Steel Foundries,
Alliance, Ohio.

Allen, Harvey A.
Asst, to M. E.
Pressed Steel Car Co.,
McKees Rocks, Pa

Allen, Jas. P.,
Sales Agent,
Union Steel Castings Co.,
61st st. and A. V. Ry.,
Pittsburgh, Pa.

Anderson, H. H.,
Sup't Schoen Steel Wheel Co.,
Pittsburg, Pa.

Anderson, H. T.,
Chief Draftsman,
Standard Steel Car Co.,
Frick Building,
Pittsburgh, Pa.

Armbrust, C. W.,
President Manufacturers Ry.
Supply Co.,
Fisher Building,
Chicago, Ill.

Atterbury, W. W.,
General Manager,
Pennsylvania R. R. Co.,
Philadelphia, Pa.

Atwood, J. A.,
Chief Engineer,
P. & L. E. R. R. Co.,
General Office,
Pittsburgh, Pa.

Ayers, H. B.,
General Supt.,
American Locomotive Co.,
Pittsburgh Works,
Allegheny, Pa.

Bagnell, R. A.,
Prest. Monthly Official Ry List
132 Nassau St.,
New York, N. Y.

Bailey, Chas. D.,
Resident Manager
Frank S. De Ronde Co.,
Ferguson Bldg.,
Pittsburg, Pa.

Baker, Edwin H.,
Rep. Galena Signal Oil Co.,
43 Water st.,
New York, N. Y.

Baldwin, Hasell W.,
V. P., T. H. Symington Co.,
Corning, N. Y.

Baldwin, Stephen Y.
Com. Frt. Agent,
D. & H. Co., Bessemer Bldg.
Pittsburgh, Pa.

Ball, Geo. L.,
Ball Chemical Co.,
907 West Diamond St.,
Allegheny, Pa.

Barney, H. E.,
Rep. Manning-Maxwell & Moore,
Park Building,
Pittsburgh, Pa.

Barnsley, Geo. T.,
City Engineer,
Pittsburgh, Pa.

Barron, John,
V. Prest. Versailles Ry Signal Co
Columbia Bank Bldg.,
Pittsburgh, Pa.

Bartley, Milton,
President American Nut &
Bolt Fastener Co.,
Frick Building,
Pittsburgh, Pa.

Barwis, J. Mc.,
Fore. Insp'r P. R. R. Co.,
Union Station,
Pittsburgh, Pa.

Basford, G. M.,
Care American Loco. Co.,
111 Broadway,
New York, N. Y.

Bealor, B. G.,
Mgr. Winfield R. R. Co.,
421 Wood st.,
Pittsburgh, Pa.

Beattie, E. G.,
Rep. Galena Signal Oil Co.,
Franklin, Pa.

Bell, C. R.,
Fore. Air Brake Shops
P. R. R. Co.,
Altoona, Pa.

Bell, W. K.,
Inspector,
Pennsylvania R. R. Co.,
Room 512,
No. 1013 Penn Ave.,
Pittsburgh, Pa.

Bellows, A. B.,
Manager,
Pittsburgh Testing Laboratory,
325 Water street,
Pittsburgh, Pa.

Bennett, H. R.,
Material Inspector P. R. R. Co.
1013 Penn Ave.,
Pittsburgh, Pa.

Bigelow, Harry T.,
Rep. Hale & Kilburn Mfg. Co.,
Fisher Building,
Chicago, Ill.

Billingham, Jos.,
Rep. Vacuum Oil Co., Ltd.,
Norfolk Street Strand,
London, W. C.

Blackall, Rob't H.,
Asst. to Genl. Manager,
Westinghouse Airbrake Co.,
Pittsburgh, Pa.

Blair, A. C.,
Vice President,
Youngstown Car Mfg. Co.,
Frick Building,
Pittsburgh, Pa.

Blattner, Jos.,
Cor. Allegheny ave. and Rebecca st.,
Allegheny, Pa.

Blest, M. C.,
Chief Draftsman,
Pressed Steel Car Co.,
444 California Ave.,
Allegheny Pa.

Blickensderfer, R.,
Consulting Engineer,
Wabash R. R. Co.,
Canton, O.

Bole, Robt. A.,
Manager, Manning, Maxwell & Moore,
Park Building,
Pittsburgh, Pa.

Bollinger, Conrad, Jr.,
Mgr. Ingersoll-Rand Co.,
Farmers Bank Bldg.,
Pittsburgh, Pa

Bonsall, J. S.,
Manager, American Engineer and Railroad Journal
Sharon Hill,
Delaware Co., Pa.

Booth, J. B.,
J. B. Booth & Co.,
225 First Ave.,
Pittsburgh, Pa.

Booth, J. K.,
Gen'l Fore. B. & L. E. R. R.,
Greenville, Pa.

Booth, Jas.,
J. B. Booth & Co.,
225 First Ave.,
Pittsburgh, Pa.

Bostwick, W. A.,
Metallurgical Engineer,
Carnegie Steel Co.,
Pittsburgh, Pa.

Bowery, Fred,
Vice-Pres. American Nut & Bolt Fastener Co.,
306 Frick Building,
Pittsburgh, Pa.

Bowery, F. J.,
Chief Draftsman,
McConway & Torley Co.,
48th St. and A. V. Ry.,
Pittsburgh, Pa

Brady, Daniel M.,
President, Brady Brass Co.,
95 Liberty street,
New York, N. Y.

Brainerd, E. C.,
Sales Agent, Nicola Bros. Co.,
Farmers Bank Bldg.,
Pittsburgh, Pa.

Brand, Thos.,
Train Master Montour R. R. Co.,
Coraopolis, Pa.

Branson, Craig R.,
Special Apprentice Penna Co.
1120 Allegheny Ave.,
Allegheny, Pa.

Brayton, Chas. A.,
President,
Standard Car Wheel Co.,
Cleveland, O.

Brittain, J. B.,
Asst. to Comp.,
Pennsylvania Lines,
Union Station,
Pittsburgh, Pa

Brooks, J. B.,
Supt. Const. Westinghouse Air Brake Co.,
Wilkinsburg, Pa.

Brown, A. D.,
C. C. to Gen'l Sup't,
P. & L. E. R. R. Co.,
Gen'l Office,
Pittsburgh, Pa.

Brown, Benson E.,
General Sales Agent,
Acme White Lead & Color Co.,
Detroit, Mich.

Brown, E. W.,
Inspector,
Pennsylvania R. R. Co.,
619 Kelly avenue,
Wilkinsburg, Pa.

Brown, H. B.,
Master Mechanic Erie R. R. Co.,
Cleveland, O.

Brown, F. Herbert,
President, Brown & Zortman Machinery Co.,
Cor. Water and Wood Sts.,
Pittsburgh, Pa.

Brown, Geo. P.,
Shop Clerk, Penn'a Co.,
1119 Franklin St.,
Allegheny, Pa.

Brown, Henry M.,
Manager,
Brown Car Wheel Works,
Buffalo, N. Y.

Brown, J. Alexander,
Manager Pocket List of R. R. Officials,
24 Park place,
New York, N. Y.

Brown, Jno. T.,
Vice Pres. and Gen'l Manager
Damascus Bronze Co.,
Allegheny, Pa.

Brown, John T., Jr.,
Sup't Duquesne Reduction Co.
5448 Stanton Ave.,
Pittsburgh, Pa

Brown, Raymond B.,
Manager,
Duquesne Reduction Co.,
Farmers Bank Bldg.,
Pittsburgh, Pa.

Brown, W. R.,
Superintendent,
Lawrenceville Bronze Co.,
31st St. and Penn Ave.,
Pittsburgh, Pa.

Bruner, Eberhart F.,
Asst C. C. to M. M., B. & O. R. R. Co.
710 Carson St.
Pittsburgh, Pa.

Buchanan, E. G.,
Rep. Carbon Steel Co.,
26 Cortlandt St.,
New York, N. Y.

Buchanan, W. J.,
M. C. B.,
B. & L. E. R. R. Co.,
Greenville, Pa

Buckley, J. T.,
Rep. Jenkins Bros.,
Park Building,
Pittsburgh, Pa

Bumbaugh, W. W.,
Pres't Monessen Foundry &
Machine Co.,
Monessen, Pa

Caldwell, J. H.,
Fore. Pur. Department,
Pressed Steel Car Co.,
291 McClure Ave.,
Allegheny, Pa.

Caldwell, Wm. E.,
Salesman Cleveland Twist
Drill Co.,
Lake and Kirkland Sts.,
Cleveland, O.

Calvert, . E.,
Chemist, P. & L. E. R. R. Co.
23 Butler St.,
Etna, Pa.

Campbell, A.,
Standard Steel Car Co.,
1608 Fisher Building,
Chicago, Ill.

Campbell, G. M.,
Electrical Engineer,
P. & L. E. R. R. Co.,
General Office,
Pittsburgh, Pa.

Campbell, I. K.,
Rep. Colonial Steel Co.,
5485 Hays St.,
Pittsburgh, Pa.

Cantrell, C. W.,
Sales Agent, Herman H.
Hettler Lumber Co.,
First Nat'l Bank Bldg.,
Pittsburgh, Pa.

Carson, Dwight,
Supt. Dining Car Dept.
Wabash R. R. Co.,
Detroit, Mich.

Carson, G. E.,
Gen'l Foreman Car Dept.,
P. & L. E. R. R. Co.,
McKees Rocks, Pa.

Cassidy, D. E.,
M. M. West Penn Div.
P. R. R. Co.,
Allegheny, Pa.

Caton, E. L.
Dept. Manager,
U. S. Metal & Mfg. Co.,
1509 Arrott Building,
Pittsburgh, Pa.

Caton, W. J.,
Sales Agent,
American Lumber Co.,
Ninth Street,
Pittsburgh, Pa.

Caughey, E. G.,
Asst Dist. Manager,
American Car & Fry Co.,
1133 Third Ave.,
Huntington, W. Va.

Chislett, Wm. B.,
Pass. Condr. P. R. R. Co.,
Union Station,
Pittsburgh, Pa.

Chittenden, A. D.,
C. C. to Gen'l Mangr. B. & L.
E. R. R., Carnegie Bldg.,
Pittsburgh, Pa.

Clancy, J. R.,
249 North Salina St.,
Syracuse, N. Y.

Clark, Edward B.,
347 Van Houten St.,
Paterson, N. J.

Coates, H. T., Jr.,
Motive Power Inspector,
Penna. R. R. Co..
30th & Carson Sts.,
Pittsburgh, Pa.

Coffin, J. S.,
Manager,
Galena Signal Oil Co.,
Franklin, Pa.

Coffin, W. E.,
Rep. National Malleable Castings Co.,
Care "The Stratford,"
Cleveland, O.

Cofrode, P.,
Master Carpenter, P. R. R. Co.,
217 Union Station,
Pittsburgh, Pa.

Collier, Paul M.
C. C. to Asst. to V. P.
Pressed Steel Car Co.,
McKees Rocks, Pa.

Comstock, E. D.,
Genl. Pass. Agent,
B. & L. E. R. R. Co.,
Carnegie Bldg.,
Pittsburgh, Pa.

Connolly, W. E.,
Superintendent,
Pennsylvania Car Wheel Co.,
499 Preble Ave.,
Allegheny, Pa.

Conway, J. D.,
Chief Clerk to S. M. P.,
P. & L. E. R. R. Co.,
General Office,
Pittsburgh, Pa.

Cooper, John,
Shop Engineer,
American Loco Co.,
Allegheny, Pa.

Cottrell, W.,
Fore. Car Repairs Erie R. R. Co.,
Wilson Ave.,
Cleveland, O.

Coulter, A. F.,
G. C. F. B. & O. R. R. Co.,
226 Elizabeth St.,
Pittsburgh, Pa.

Coursin, J. F.,
General Foreman,
Pennsylvania R. R. Co.,
Pitcairn, Pa.

Courtney, D. C.,
President,
Courtney Bolster & Truck Co.,
1130 Sheffield St.,
Allegheny, Pa.

Courtney, W. J.,
Manager Peerless Rubber Mfg. Co.,
16 Warren St.,
New York, N. Y.

Cowan, John,
Master Car Builder,
Pennsylvania R. R. Co.,
Verona, Pa.

Cox, Geo. W.,
Genl. Sales Agent,
Fort Pitt Spring & Mfg. Co.
Farmers Bank Bldg.
Pittsburgh, Pa.

Cox, H. A.,
Rest. Manager,
Commercial Electric Co.,
Bessemer Bldg.,
Pittsburgh, Pa.

Coxe, Frederick W.,
Sales Agt. Cambria Steel Co.,
311 Delaware Ave.,
Buffalo, N. Y.

Crawford, D. F.,
Genl. Supt. Motive Power,
Pennsylvania Lines West,
Pittsburgh, Pa.

Cromwell, S. A.,
G. F. C. D.—B. & O. R. R. Co.,
Painesville, Ohio.

Crouch, A. W.,
Engineering Dept.,
Dearborn Drug & Chemical Co.,
House Building,
Pittsburgh, Pa.

Cullen, Jas. K.,
President,
Niles Tool Works,
Hamilton, Ohio.

Cunningham, J. D.,
Sales Agent,
New York Car Wheel Co.,
Allegheny, Pa.

Currie, J. C.,
Rep. Nathan Mfg. Co.,
92 Liberty St.,
New York, N. Y.

Dallam, C. B.,
President,
Pittsburgh Oil Refining Co.,
Box 1315,
Pittsburgh, Pa.

Dambach, C. O.,
C. C. to Gen'l Supt., W. & L. E. R. R. Co.,
Wabash Bldg.,
Pittsburgh, Pa.

Darby, H. F., Jr.,
Dist Manager,
Cutter Electric & Mfg. Co.,
Farmers Bank Building.
Pittsburgh, Pa

Darby, R. F.,
Draftsman, L. S. & M. S. Ry Co.
Cleveland, Ohio.

Daugherty, J. B.,
R. F. of E., B. & O. R. R. Co.,
410 Cherry St.,
New Castle, Pa.

Davis, E. E.
S. M. P., B. R. & P. Ry.,
DuBoies, Pa.

Davis, G. H.,
Fore. Car Dept. Wabash-Pittsburgh Ter. Ry. Co.,
Care Wabash Bldg.,
Pittsburgh, Pa.

Davis, Thos. R.,
General Manager, Graphite Carbon Paint & Color Co.,
Wilson. Pa.

Day, Edward B.,
Resident Manager,
Railway & Engineering Review,
Farmers Bank Building,
Pittsburgh, Pa

DeArmond, W. C.,
President, Protectus Co.,
North American Building,
Philadelphia, Pa.

Decker, O. S.,
G. S. A. Sligo Iron & Steel Co.,
Pittsburgh, Pa.

DeGress, Francis B., M. E.,
Manager,
Crocker Wheeler Co.,
39-41 Cortlandt St.,
New York, N. Y.

Demerest, T. W.,
Supt. Motive Power,
Pennsylvania Lines,
Ft. Wayne, Ind.

DeRemer, W. L.,
Rep. Spencer Otis Co.,
1707 Railway Exchange Bldg.,
Chicago, Ill.

Devlin, F. X.,
Pur. Agt. Spang Chalfant & Co.,
Peoples Savings Bank Bldg.,
Pittsburgh, Pa.

Diamond, P. R.,
Magnus Metal Co.,
Buffalo, N. Y.

Ditchfield, Frank,
Asst. Chief Engineer,
Pressed Steel Car Co.,
30 Jackson St.,
Bellevue, Pa.

Donahue, C. J.,
Chief Clerk to General Manager
L. S. & M. S. Ry. Co.,
Cleveland, O.

Dow, Geo. N.,
Genl Mechanical Inspector,
L. S. & M. S. Ry. Co.,
Collinwood, O.

Dowdell, Augustus,
Rep. Valentine & Co.,
57 Broadway,
New York, N. Y.

Dreyfus, T. F.,
General Foreman,
Pennsylvania Company,
Mahoningtown, Pa.

Duer, B. W.,
Supt. B. & O. R. R. Co.,
B. & O. Station,
Pittsburg, Pa.

Dukesmith, F. H.,
Prest. Dukesmith Air Brake Co.
Ferguson Block,
Pittsburgh, Pa.

Dunham, F. C.,
Special Sales Agent,
U. S. Metal & Mfg. Co.,
25 Broad St.,
New York, N. Y.

Duntley, W. O.,
Vice President,
Chicago Pneumatic Tool Co.,
Fisher Building,
Chicago, Ill.

Dunn, F. L.,
Care Barney & Smith Car Co.
Dayton, Ohio.

Dunn, M.,
Supt. Motive Power,
Pennsylvania Lines West,
Columbus, O

Dyer, Jos.,
Chief Joint Inspector,
P. & L. E. and Erie R. R. Cos.,
Youngstown, O.

Eggleston, R. E.,
Genl. Mgr. Pullman Automatic Ventilator Co.,
York, Pa.

Elder, Thos. W.,
Pressed Steel Car Co.,
No. 24 Broad Street,
New York, N. Y.

Elliott, J. B.,
M. M., B. & O. R. R. Co.,
NewCastle, Jct., Pa.

Elmer, Wm., Jr.,
Asst. Engineer Motive Power,
Pennsylvania R. R. Co.,
Altoona, Pa.

Engstrom, Frans,
Civil Engineer,
American Bridge Co.,
Ambridge, Pa.

Evans, R.,
Purchasing Agent,
P. & L. E. R. R. Co.,
General Office,
Pittsburgh, Pa

Evans, R. J.,
General Manager,
Franklin Mfg. Co.,
Franklin, Pa.

Farnan, O. E.
Asst. Train Master, B & O. R. R. Co.,
4631 Second ave., Hazelwood
Pittsburg,h, Pa.

Faul, G. H.,
Chief Clerk,
Youngstown Car Mfg. Co.,
Youngstown, O
Carnegie, Pa.

Fenwick, Wm.,
G. F. C. D. Wabash-Pittsburgh Ter. Ry. Co.,
Canton, O.

Ferguson, O. G.,
Train Master Monon. Con. R. R.,
Second Ave. near Bates St.,
Pittsburgh, Pa.

Ferguson, W. L.,
Secy. Jas. B. Sipe & Co.,
400 Federal St.,
Allegheny, Pa.

Fitz, E. M.,
Motive Power Inspector,
Pennsylvania Lines,
295 North High St.,
Columbus, O.

Flannery, Jas. J.,
Prest. Flannery Bolt Co.,
Frick Building,
Pittsburg, Pa.

Flinn, C.,
Asst. Gen'l Manager,
Pressed Steel Car Co.,
McKees Rocks, Pa.

Foller, Chas S.,
Mechanical Engineer,
,Union Spring & Mfg. Co.,
Farmers Bank Building,
Pittsburgh, Pa.

Ford, D. W.,
Chief Matl. Inspector,
Pennsylvania R. R. Co.,
C17 Kelly Ave.,
Wilkinsburg, Pa.

Forgeus, E. E.
Minneapolis, Kas.

Forsberg, R. P.,
Chief Draftsman,
P. & L. E. R. R. Co.,
General Office,
Pittsburgh, Pa.

Foster, F. B.,
Sec'y Schoen Steel Wheel Co.,
Frick Building,
Pittsburgh, Pa.

Fox, J. B..
Storekeeper, Erie R. R. Co.,
Wilson Ave. Shops,
Cleveland, O.

Francis, Jno. S.,
Mechanical Engineer,
331 Fourth Ave.,
Pittsburgh, Pa.

Frank, Laurence W.,
Secy. Duquesne Steel Fd'y Co.'
Arrott Building,
Pittsburgh, Pa.

Freed, George F.,
Supt., Duff Mfg. Co.,
1120 Allegheny Ave.,
Allegheny, Pa.

Frost, Harry W.,
President,
The Frost Railway Supply Co.
Detroit, Mich.

Frost, John B.,
Supt. Car Service,
Oliver Snyder Steel Co.,
Box 829
Connellsville, Pa.

Fuller, S. R., Jr.,
Sales Agent,
Gould Coupler Co.,
1 W. 34th Street,
New York, N. Y.

Gallaudet, D.,
Genl Foreman, B. & O.R. R. Co.
Glenwood, Pittsburg, Pa.

Galloway, W. S.,
Asst. Pur. Agent B. & O.R. R. Co.
Baltimore, Md.

Gayley, O. C.,
Manager of Sales,
Pressed Steel Car Co.,
24 Broad St.,
New York, N. Y.

Gardner, Henry,
Care H. K. Porter Co.
49th Street,
Pittsburgh, Pa.

Garrett, M. A.,
V. P., Farlow Draft Gear Co.,
Monadnock Block,
Chicago, Ill.

Gearhart, H. J.,
Sec'y Pennsylvania Malleable Co.,
205 South Neville St.,
Pittsburgh, Pa.

Gearhart, J. A.,
Motive Power Inspector,
Penn'a R. R. Co.,
216 Union Station,
Pittsburgh, Pa.

Gibb, J. B.,
208 Forbes Bldg.,
Pittsburgh, Pa.

Gies, Geo. E.,
General Foreman,
Pennsylvania Company,
1244 Juniata St.,
Allegheny, Pa.

Giesey, V. A.
Rep, Harbison, Walker Ref. Co
Farmers Bank Bldg.
Pittsburgh, Pa.

Gilbert, E. B.,
Supt. Motive Power,
B. & L. E. R. R. Co.,
Greenville, Pa.

Gildroy, Geo. J.,
Supt. M & H. Div.,
Lehigh Valley R. R. Co.,
Hazelton, Pa.

Gilpin, F. M.,
General Sales Agent,
Latrobe Steel Company
Old Colony Bldg
Chicago, Ill

Gilpin, H. E.
Geueral Supperintendent,
Erie R. R. Co.
Cleveland, O.

Gillen, Jno.,
Draftsman,
Standard Gauge Steel Co.,
Beaver Falls, Pa.

Gillespie, John M.
G. S. A. Lockhart Iron & Steel
Co.
McKees Rocks,, Pa.

Gold, Egbert H.,
Car Heating Apparatus
Railway Exchange Building,
Chicago, Ill.

Goodell, G. H.
Railway Suupplies,
516 Pioneer Press Building,
St. Paul, Minn.

Gordon, C. E.,
Asst. Storekeeper, Penna Co.,
700 Arlington Ave.,
Allegheny, Pa.

Gorman, T. F.,
General Foreman Erie R.R.Co.
Youngstown, Ohio.

Gorsuch, C. B.,
Train Master B. & O. R. R. Co.
Pittsburg, Pa.

Graham, W. C.,
Manager of Works,
Penna. Malleable Co.,
McKees Rocks. Pa.

Gratten, James,
Foreman Painter,
B. R. & P. Ry. Co.
DuBois, Pa.

Gray, Guy M.,
Mechanical Engineer,
B. & L. E. R. R. Co.,
Greenville, Pa.

Gray, Robert,
Assist. R. F. of E.,
P. & L. E. R. R. Co.,
Brunot Avenue
Esplen Boro,, Pittsburgh, Pa

Greer, J. B.,
V. P. and General Manager,
Greer Filter Company,
Perry Building,
Philadelphia, Pa.

Grewe, H. F.,
Fore. Loco. Dept. Wabash—
Pittsburgh Ter. Ry. Co.
Carnegie, Pa.

Grieves, E. W.,
Rep. Galena Signal Oil Co.,
1756 Park ave.,
Baltimore, Md.

Grove, E. M.,
Treasurer,
McConway & Torley Co.,
48th st and A. V. Ry.,
Pittsburgh, Pa.

Grooms, J. C.,
Land and Claim Agent,
P. & L. E. R. R. Co.,
General Office,
Pittsburgh, Pa.

Grubb, Jos. H.,
Rep. Hussey Binns Shovel Co.
and Schroeder Head Light
Co.,
4222 Walnut St.,
Philadelphia, Pa.

Grubbs, Barton,
Rep. Am. Nut & Bolt Fastener Co.,
Frick Building,
Pittsburgh, Pa.

Gulland, Chas.,
Asst. Plumber,
Pennsylvania R. R. Co.,
7941 Maderia St.,
Pittsburgh, Pa.

Gulick, H. Jr.,
Chief Inspector, Car Dept.,
R. W. Hunt & Co.,
Glenshaw, Pa.

Haas, Ben.
Mangr. Jos. Joseph Bros. Co.,
Park Bldg.,
Pittsburgh, Pa.

Hall, H. F.,
Supt. Gen'l Railway Signal Co.
P. O. Box 1052,
Rochester, N. Y.

Hall. W. G.,
Clerk,
P. & L. E. R. R. Co.,
General Office,
Pittsburgh, Pa.

Hall, C. W.,
Fore. Loco. Repairs,
Pennsylvania Company,
Hot Springs, Ark.

Halleran, H. J.,
Order Dept. Standard Steel Car Co., Frick Building,
Pittsburgh, Pa.

Hamilton, Taber,
Asst. M. M., Penn'a R. R. Co.,
Verona, Pa.

Hammond, O. J.,
General Freight Agent,
B. & L. E. R. R. Co.,
Carnegie Building,
Pittsburgh, Pa.

Hanlon, H. R.,
C. C. to Gen'l Supt.
B. & O. R. R. Co.,
Pittsburgh, Pa

Hansen, J. M.,
President,
Standard Steel Car Co.,
Frick Building,
Pittsburgh, Pa.

Haring, Ellsworth,
Rep. Herman Boker & Co.,
684 Hancock St.,
Brooklyn N. Y.

Hart, Frank B.,
Manager of Sales,
Excelsior Car Roof Co.,
1167 Fourteenth ave.,
Detroit, Mich

Harris, J. D.,
Asst. Chief Engineer,
Westinghouse Air Brake Co.,
Wilmerding, Pa.

Hastings, Chas. L.,
Rep. Pgh. Gage & Supply Co.
309 Water Street,
Pittsburgh, Pa.

Hays, R. F.,
Western Rep., The Curtain pply Co.,
93 Ohio Street,
Chicago, Ill.

Hayes, Scott R.,
Rep.. Railway Steel Spring Co
71 Broadway,
New York, N. Y

Haynes, John,
Fore. Mach. Shops,
Pittsburg Coal Co.
Coraopolis, Pa.

Hempsted, Jas. G.,
Supt. Oliver Iron & Steel Co.,
Crafton, Pa.

Henderson, J. W.,
Supt. Central Car Wheel Co.,
McKees Rocks, Pa.

Henry, John K.,
Salesman,
Brown & Zortman Mach. Co.
No. 1 Wood St.,
Pittsburgh, Pa.

Herr, E. M.
First Vice pres't
Westinghouse Electric &
Mfg. Co.,
Mfg. Co.,
P. O. Box, 911,
Pittsburgh, Pa.

Herman, R.
Manufacturer Ry. Auto. Signals
Crafton, Pa.

Hill, J. B. Jr.,
Traffic Manager,
American Sewer Pipe Co.,
2d Nat'l Bank Bldg.,
Pittsburgh, Pa.

Hindman, S. M.,
General Inspector P. R. R. Co.
Pitcairn, Pa.

Hirsh, Wm.,
Sales Agent,
American Steel & Wire Co.,
Pittsburgh, Pa.

Hobart, Nathaniel P.,
Rep. American Brake Shoe Co.,
170 Broadway,
New York, N. Y.

Hobson, Bailey E.,
President,
Tri-State Mining & Mfg. Co.,
248 Fourth ave.,
Pittsburgh, Pa.

Hobson, J. S.,
Asst. Gen'l Manager,
Union Switch & Signal Co.,
Swissvale, Pa.

Hoffman, N. K.,
Supt. Car Service,
P. & L. E. R. R. Co.,
General Office
Pittsburgh, Pa.

Holbrook, David O.,
Vice President,
Pennsylvania Malleable Co.,
Frick Building,
Pittsburgh, Pa.

Holmes, A. L.
Asst. Master Mechanic,
West Penn Div., P. R. R. Co.,
Allegheny, Pa.

Holp, John L.,
Ass't Foreman, B. & O. R.R.Co.
330 Johnston Ave.,
Pittsburgh, Pa.

Hood, Chas Y.,
Consulting Engineer,
Hood Automatic Window Co.,
Carl Bldg.,
Wilikinsburg, Pa.

Hood, D. G.,
Frt. Ag't P. & L. E. R. R. Co.,
Pittsburgh, Pa.

Hooff, J. L.,
Inspector,
Pennsylvania R. R. Co.,
909 Lexington ave
Altoona, Pa.

Hornberger, J. B. L.,
Comp. Pittsburgh Coal Co.,
Pittsburgh, Pa.

Horner, H. G.,
C. C. to Gen'l Foreman,
Penn'a Lines West,
Conway, Pa.

Horner, James,
Care Fitz-Hugh Luther Co.,
Hammond, Ind.

Howard, C. H.,
Prest. Commonwealth Steel Co.
Bank of Commerce Bldg.
St. Louis, Mo.

Howe, David M.,
Manager,
Jos. Dixon Crucible Co.
2213 Farmers Bank Bldg.,
Pittsburgh, Pa.

Hubbard, Chas. S.,
Gen'l Manager,
H. M. Myers Co.,
Beaver Falls, Pa.

Hubbell, Ira C.,
President,
Locomotive Appliance Co.,
Old Colony Building,
Chicago, Ill.

Hughes, J. E.,
Yard Master P. & L. E. R. R.,
Glassport, Pa.

Hukill, J. L.,
President,
Hukill-Hunter Co.,
311-315 First Ave.,
Pittsburgh, Pa.

Humphrey, A. L.,
Genl. Manager, Westinghouse
Air Brake Co.,
Wilmerding, Pa.

Hunter, D. Jr.,
Dist. Mangr. Under Feed
Stoker Co of America,
Park Building,
Pittsburgh, Pa

Hunter, H. S.,
Pittsburg Manager,
Chicago Pneumatic Tool Co.,
Empire Building,
Pittsburgh, Pa.

Hunter, R. F.,
Vice President,
Hukill-Hunter Co.,
311-315 First Ave.,
Pittsburgh, Pa.

Huntley, F. P.,
Secretary,
Gould Coupler Co.,
No. 1 West 34th St.,
New York, N. Y.

Hurd, A. B.,
Checker, Pressed Steel Car Co.
32 Harrison Ave.
Bellevue, Pa.

Hurd, D. F.,
Gen'l Agent, L. S. & M. S. Ry.,
Park Bldg.,
Pittsburgh, Pa

Huyett, E. G.,
Chief Estimator,
Standard Steel Car Co.,
Frick Building,
Pittsburgh, Pa.

Hussey, John U.,
Assistant Treasurer,
National Car Wheel Co.,
Park Building,
Pittsburg, Pa.

Hyndman, F. T.,
Gen'l Master Mechanic
N. Y. N. H. & H. R. R. Co.,
New Haven, Conn.

Hyndman, H. R.,
Asst. General Freight Agent,
Washington Run R. R. Co.,
Conestoga Building,
Pittsburgh, Pa.

Hyndman, N. P.,
Gen'l Freight & Pass. Agent,
Washington Run R. R. Co.
Conestoga Building,
Pittsburgh, Pa.

Illingworth, T. W.,
Rep. Midvale Steel Co.,
1527 Butler St.,
Philadelphia, Pa.

Isbester, G. C.,
Rep. Railway Appliances Co.,
Old Colony Building,
Chicago, Ill.

Isler, Chas. J.,
Div. Operator. Penn R. R. Co.,
South 30th St.,
Pittsburgh, Pa.

Jackson, M. R.,
General Manager,
Schoen Steel Wheel Co.,
Frick Building,
Pittsburgh, Pa.

Jacoby, W. L.
Supt. Latrobe Steel & Coupler
Co.,
Melrose Park, Ill.

Jefferson, E. Z.,
Manager R. R. Dept.
Quaker City Rubber Co.,
Conestoga Bldg.,
Pittsburgh, Pa

Jenney, Jacob,
G. F. C. R.
Monon. Div. P. R. R. Co.,
30th street, S. S.,
Pittsburgh, Pa.

Jennings, F. R.,
Engineering Dept. Pressed Steel
Car Co., 58 Sheridan Ave.,
Bellevue, Pa.

Johnson, C. S.,
327 Milvale Ave.,
Pittsburgh, Pa.

Johnson, W. M.,
V. P. Schoen Steel Wheel Co.,
Arcade Bldg.,.
Philadelphia, Pa.

Johnson, Wallace W.,
Sales Manager,
Franklin Mfg. Co.,
4037 Girard ave.,
Philadelphia, Pa.

Johnston, Lucius S.,
Pass. Cond'r P. R. R. Co.,
533 Winfield St.,
Pittsburgh, Pa.

Johnston, W. C.,
Genl. Manager, Monon. Iron & Steel Co.,
Box 215,
Pittsburgh, Pa.

Jones, L. W.,
Sewickley, Pa.

Judy, G. H.,
Fore. Blacksmith, B. & O. R. R.
1512 Franklin St.,
Pittsburgh. Pa.

Kalbaugh, C. T.,
Train Master,
P. & L. E. R. R. Co.,
McKeesport, Pa.

Kalbaugh, I. N.,
Supt. Motive Power,
W. Va. Cen. & Pgh. Ry.,
Elkins, W. Va.

Kearney, Alexander,
Ass't Supt. Motive Power,
Norfolk & Western Ry. Co.,
Roanoke, Va.

Keith, Jno. T.,
Superintendent,
Lehigh Valley Ry. Co.,
Buffalo, N. Y.

Keithley, J. T.,
Genl. Foreman,
H. C. Frick Coke Co.,
Everson, Pa.

Kelly, Moore,
Rep. Ajax Metal Co.,
2nd Nat. Bank Building,
Pittsburgh, Pa.

Kelley, Wm. V.,
Pres't Am. Steel Foundries,
Chicago, Ill.

Kennedy, D. B.,
Rep. Wm. B. Scaife & Sons Co.
Pittsburgh, Pa.

Keppel, A. M.,
Asst. Train Master,
Pennsylvania R. R. Co.,
28th St.,
Pittsburgh, Pa

Kerr, Edward,
President,
Lawrenceville Bronze Co.,
31st st. and Penn ave.,
Pittsburgh, Pa

Kerr, Geo. M.
Manager,
Berry Bros.,
Park Building,
Pittsburgh, Pa

Kerr, J. K.,
G. Y. M. Monon. Connect'g R. R.
Second Ave., near Bates St.,
Pittsburgh. Pa.

Kessler, D. D.,
Road Foreman Engines,
P. & L. E. R. R.,
McKees Rocks, Pa

Keys, S. B.,
Agent, Consolidated Car Heating Co.,
Park Row Building,
New York, N. Y.

Kincaid, J. W.,
Mechanical Engineer,
2627 Hemlock St.,
Walnut Hills,
Cincinnati, O.

Kincaid, B. M.,
Inspector,
Pennsylvania R. R. Co.,
1327 Sixth ave.,
Altoona, Pa

King, C. F.,
Yard Master P. & L. E. R. R.
Haselton, O

Kinter, D. H.,
General Foreman Car Dep't.,
Monongahela R. R. Co.,
Brownsville, Pa.

Kirkpatrick, J.,
M. M., B. & O. Co.,
Cumberland, Md.

Kleine, R. L.,
General Car Inspector, P. R
R. Co.,
Altoona, Pa.

Klee, W. B.,
President,
Damascus Bronze Co.,
Pittsburgh, Pa

Knickerbocker, A. C.,
Checker, Pressed Steel Car Co.,
1418 Locust St.,
Allegheny, Pa.

Knight, E. A.,
Asst. General Foreman,
Pennsylvania Co.,
Allegheny, Pa.

Knox, Wm. J.,
Mechanical Engineer,
B. R. & P. Ry. Co.,
DuBois, Pa.

Korba, W. J.,
Machinist Monon. Con. R. R.
Co.,
Second Ave. near Bates St.,
Pittsburgh, Pa

Krause, Julius,
Fore. Car Inspector, P. R. R.
Co.,
Pitcairn, Pa.

Krauth, S. F.,
Rep., Pittsburgh Spring & Steel
Co.,
Farmers Bank Building,
Pittsburgh, Pa.

Lafferty, H. C.,
Foreman Painter—American
Car & Foundry Co.,
Berwick, Pa.

Lamar, A.,
Asst. Gen'l Car Inspector,
Penn'a Lines N. W. System,
Fort Wayne, Ind.

Lambe, G. C.,
Asst. Engr., Engineering Dept.
Pressed Steel Car Co.,
McKees Rocks, Pa.

Lanahan, Frank J.,
Sec. and Treas., Fort Pitt Mall.
& Grey Iron Co.,
Pittsburgh, Pa.

Landis, Jno. W.,
Rest. Manager,
The Goubert Mfg. Co.,
Murtlandt Building,
Pittsburgh, Pa.

Lanfersiek, Jno. F.,
Foreman Painter,
P. C. C. & St. L. Ry. Co.,
Columbus, O.

Laughlin, C. W.,
Rep. Manning, Maxwell &
Moore, Park Bldg.,
Pittsburgh, Pa.

Lawson, Sherman S.,
Fore. Drawing Room
American Loco. Co.,
Allegheny, Pa.

Lee, L. A.,
Wire Chief,
P. & L. E. R. R. Co.,
General Office,
Pittsburgh, Pa.

Lewis, E. S.,
Rep. Standard Steel Works,
Swarthmore, Pa.

Lindstrom, Chas. A.,
Chief Engineer,
Pressed Steel Car Co.,
McKees Rocks, Pa.

Lininger, E. W.,
807 Southern Ave., Mt. Oliver,
Pittsburgh, Pa.

Lininger, W.,
Master Mechanic,
Monon. Div. P. R. R. Co.,
S. S., Pittsburgh, Pa.

Lobez, P. L.,
Draftsman,
Westinghouse Air Brake Co.,
820 South ave.,
Wilkinsburg, Pa.

Long, Chas. R. Jr.,
President,
Chas. R. Long & Co.,
622-630 East Main St.,
Louisville, Ky.

Long, Prof. J. H.,
Demonstrator and Lecturer,
510 Sandusky St.,
Allegheny, Pa.

Long, R. M.,
Asst. R. F. of E.,
P. & L. E. R. R. Co.,
McKees Rocks, Pa.

Low, Edgar S.,
President & General Manager,
Edgar S. Low Co.,
Empire Building,
Pittsburgh, Pa.

Ludgate, B. A.,
Chief Draftsman,
P. & L. E. R. R. Co.,
General Office,
Pittsburgh, Pa.

Lynn, P. A.,
Supervisor, Pgh. Car Service Assoc.,
Westinghouse Bldg.,
Pittsburgh, Pa.

Lynn, Sam'l.,
Fore. Passenger Cars,
P. & L. E. R. R.
Pittsburgh, Pa.

Lyons, R. V.,
Rep. A. T. Hagen Co.,
26 S. Clinton St.,
Chicago, Ill.

Macfarlane, W. E.,
Asst. Road Foreman Engines,
Mon. Div. P. R. R. Co.,
32d St., S. S.,
Pittsburgh, Pa.

Macomber, D. L.,
Rest. Mangr. Pratt & Whitney Co., Frick Building,
Pittsburgh, Pa.

Madden, W. E.,
M. P. Clerk, P. V. & C. Ry.,
32nd & Carson Sts.,
Pittsburgh, Pa.

Maher, J. V.,
Asst. to Vice President,
Pressed Steel Car Co.,
McKees Rocks, Pa.

Malloy, M. A.,
Master Mechanic,
Monon. Div. P. R. R. Co.,
32d and Carson Sts., S. S.
Pittsburgh, Pa.

Marsh, W. A.
Sales Agent,
Pittsburgh Coal Company,
Pittsburgh, Pa.

Marshall, W. H.,
General Manager,
L. S. & M. S. Ry. Co.,
Cleveland, O.

Martin, C. W.,
Agent Martin Car Heating Co.
1611 Fisher Building,
Chicago, Ill.

Mason, R. L.,
Mangr., Railway Dep't.
Hubbard & Co.,
Pittsburgh, Pa.

Mason, Stephen C.,
Secretary,
McConway & Torley Co.,
48th St. & A. V. Ry.,
Pittsburgh, Pa.

Mathiott, G. S.,
Agent, P. & L. E. R. R. Co.,
Glassport, Pa.

Meason, H. M.,
Asst. M. M. P. R. R. Co.,
28th and Liberty Ave.,
Pittsburgh, Pa

Meckel, O. P.,
Secretary Baird Machy Co.,
123 Water St.,
Pittsburgh, Pa.

Mechling, J. E.,
Master Mechanic,
Vandalia Line,
Terre Haute, Ind.

Mellon, Wm. P.,
Rep. Valentine & Company,
277 Dearborn St.,
Chicago, Ill.

Melson, W. C.,
Fore. Car Repairs,
Pittsburgh Coal Co.,
Coraopolis, Pa.

Mercer, Richard S.,
Agent, American Brake Shoe & Foundry Co.,
170 Broadway,
New York, N. Y.

Merchant, Gerald E.,
219 Cutler Building,
Rochester, N. Y.

Meredith, H. P.,
Asst. Eng'r, M. P., P. R. R. Co.,
1214-13th Street,
Altoona, Pa.

Metcalf, Wm.,
Pres't, Braeburn Steel Co.,
Braeburn, Pa.

Michel, Wm. J.
Rep. National Lead & Oil Co., of Penna.
2d Nat. Bank Bldg.,
Pittsburgh, Pa.

Miller, C. R.,
Asst. Pur. Agent,
Carnegie Steel Co.,
Carnegie Building,
Pittsburgh, Pa.

Miller, F. L.,
Agent, P. R. R. Co.,
Shady Side Station,
Pittsburgh, Pa.

Miller, Geo. W.,
7229 McPherson St.,
Pittsburgh, Pa.

Miller, Ira H.,
Rep. Crucible Steel Co., of America,
Pittsburgh, Pa.

Miller, Jno. F.,
Vice President,
Westinghouse Air Brake Co.,
Pittsburgh, Pa.

Miller, Marion M.,
Inspector,
Pittsburgh Testing Laboratory,
325 Water St.,
Pittsburgh, Pa.

Miller, Orlando,
Pur. Agent,
Westinghouse Air Brake Co.
Wilmerding, Pa.

Miller, Wilson,
937 Lincoln Ave.,
Allegheny, Pa.

Milligan, J. D.,
Chief Surgeon,
P. & L. E. R. R. Co.,
Bank for Savings Building,
Pittsburgh, Pa.

Milligan, Wm.,
Genl. Fore.
Pressed Steel Car Co.,
4020 Westminister St.,
Allegheny, Pa.

Milliken, I. H.,
Rep. McConway & Torley Co.
48th St. and A. V. Ry.,
Pittsburgh, Pa.

Miner, W. H.,
Railway Supplies,
669 Rookery Building,
Chicago, Ill.

Mitchell, A. G.,
Supt. P. R. R. Co.,
3000 Sarah St.,
S. S., Pittsburgh, Pa.

Mitchell, Geo. E.,
Rep. J. R. Clancy,
247 N. Salina St.,
Syracuse, N. Y.

Mitchell, J. W.,
Rep. Brown & Co.,
10th St., S. S.,
Pittsburgh, Pa.

Morgan, Arthur,
C. C. to G. Y. M.
P. &. L. E. R. R. Co.,
920 Marshall St.,
Youngstown, Ohio.

Morris, W. B.,
City Ticket Agent,
P. & L. E. R. R. Co.,
Park Building,
Pittsburgh, Pa.

Morse, C. S.,
M. C. B. Wheeling & Lake
Erie Ry. Co.,
Toledo, O

Mortland, Walter G.,
Sec. & Treas.
International Supply Co.
Frick Building,
Pittsburgh, Pa

Mooney, J. W.,
Rep. Ingersoll, Sargent Drill
Co., Park Building,
Pittsburgh, Pa.

Moore, A. F.,
G. F. C. R., P. C. C. & St. L. R.R.
458 Morrow Ave.,
Carnegie, Pa.
Moore, Frank,
Prest. Pittsburgh Brake Shoe Co.
Farmers Bank Bldg.,
Pittsburgh, Pa

Mowry, Jas. G.,
Railway Rep. Patton Paint Co.,
Newark, N. J.

Moyer, F. Hughes,
Engineer,
Carnegie Steel Co.,
Carnegie Building,
Pittsburgh, Pa

Murphy, W. J.,
Asst. Foreman,
Boiler Shop Penna. Co.,
1004 Lamont St.,
Allegheny, Pa

McAndrews, J.,
G. Y. M. Penna Lines West,
Freedom, Pa

McCandless, Geo. W.
Auditor,
McConway & Torley Co.,
48th St. and A. V. Ry.
Pittsburgh, Pa

McCartney, J. L.,
Rep. Niles-Bement Pond Co.,
Frick Building,
Pittsburgh, Pa

McCarty, R. E.,
Superintendent,
Pennsylvania Lines West
of Pittsburgh,
Pittsburgh, Pa

McCaslin, A. W.,
Master Blacksmith,
P. & L. E. R. R. Co.,
McKees Rocks, Pa.

McConnell, C. H.,
Electrician P. & L. E. R. R. Co.
Beaver, Pa.

McConnell, J. H.,
439 Shady Ave.,
Pittsburgh, Pa

McConway, Wm. Jr.,
Superintendent,
McConway & Torley Co.,
48th St. and A. V. Ry.,
Pittsburgh, Pa.

McCool, Peter,
President,
The Butler Foundry & Machine Co.,
Butler, Pa.

McCormick, W. H.,
Rep. Wisconsin Graphite Co.,
Allegheny, Pa.

McCrea, Archibald M.,
President,
Union Spring & Mfg Co.,
Farmers Bank Building,
Pittsburgh, Pa.

McCune, Frank,
General Supt.,
Monon. Connecting R. R. Co.,
2nd Ave. near Bates St.,
Pittsburgh, Pa.

McDonnell, F. V.,
Fore., Penna. Co.,
1016 Lamont St.,
Allegheny, Pa.

McFeatters, F. R.,
Superintendent,
Union R. R. Co.,
Port Perry, Pa.

McGary, S. R.,
Steel Expert,
Johnson-Peter Co.,
House Bldg.,
Pittsburgh, Pa.

McIlwain, Harry,
Rep. J. D. McIlwain & Co.,
208 Third Ave.,
Pittsburgh, Pa.

McIlwain, J. D.,
Prest. J. D. McIlwain & Co.,
208 Third Ave.,
Pittsburgh, Pa.

McIntire, J. B.,
Chief Engineer,
St. Clair Terminal R. R. Co.
Frick Building,
Pittsburgh, Pa.

McKee, F. E.,
Elec. Engr. Pressed Steel Car Co.,
McKees Rocks, Pa.

McKee, S. Frank,
Pur. Agt.,
Pennsylvania Car Wheel Co.
Allegheny, Pa.

McKenna, E. P.,
Gen'l Frt. & Passenger Agt.,
Cumberland & P. R. R. Co.,
Cumberland, Md.

McLean, E.,
Foreman P. R. R. Co.,
Altoona, Pa.

McLean, Geo. A.,
Iron and Steel Manufacturer,
Lewis Block,
Pittsburgh, Pa.

McMahon, W. C.,
Manager of Sales,
Monarch Coupler Co.,
Detroit, Mich.

McMaster, H. W.,
Gen. Supt. Wabash-Pittsburgh Terminal Ry.
Pittsburgh, Pa.

McMullin, F. V.,
Mechanical Engineer,
419 Smith Block,
Pittsburgh, Pa.

McNamara, D.,
Mech. Expert Galena Signal Oil Co.,
788 North Park Ave.,
Meadville, Pa,

McNary, Jas. E.,
Mechanical Engineer,
Tranter-Davis Mfg Co.,
105 Water St.,
Pittsburgh, Pa.

McNaugher, Jos.,
Sec'y Latshaw Pressed Steel & Pulley Co.,
Grant & Penna Aves.,
Allegheny, Pa.

McNulty, F M.,
Master Mechanic,
Monon. Connecting R. R. Co.,
2nd Ave., near Bates St.,
Pittsburgh, Pa.

McTaggart, Jas. R.,
City Chemist,
Public Safety Building,
Pittsburgh, Pa.

McVicar, G. E.,
Expert,
Galena Signal Oil Co.,
Franklin, Pa.

Nanna, F. J.,
Asst. Engineer,
P. & L. E. R. R. Co.,
General Office,
Pittsburgh, Pa.

Neale, Jas.,
Secretary,
Brown & Company,
Tenth Street,
Pittsburgh, Pa.

Neilson, Geo. H.,
General Manager,
Braeburn Steel Co.,
Braeburn, Pa.

Newland, H. F.,
Electrician, Penna. Co.,
608 California Ave.,
Avalon, Pa.

Newman, Thos. E.
R. F. of E., B. & O. R. R. Co.,
5316 Gertrude St.,
Pittsburgh, Pa.

Nickel, J. K.,
C. C. to M. M. Monon. Con. R. R. Co.
Second Ave. near Bates St.
Pittsburgh, Pa,

Noble, D. C.,
President,
Pittsburg Spring & Steel Co.,
1417 Farmers Bank Building,
Pittsburgh, Pa.

Oates, Geo. M.,
Foreman Painter,
Pressed Steel Car Co.,
429 Jucunda St.,
Knoxville, Pa.

Obey, G. B.,
Superintendent,
Monongahela R. R. Co.,
Brownsville, Pa.

O'Brien, Thos. J.,
Superintendent,
Standard Steel Car Co.,
Butler, Pa.

Ogden, Geo. D.,
Div. Frt. Agt. P. R. R. Co.,
Union Station,
Pittsburgh, Pa.

Orchard, Chas.,
Supt. Shipping Dept.,
Carnegie Steel Co.,
Munhall, Pa.

Orr, J. W.,
Ass't to Comp.
Penna. Lines West,
Union Station,
Pittsburgh, Pa.

Osborne, H. C.,
Supt. Masonry & Water Supply,
P. & L. E. R. R. Co.,
General Office,
Pittsburgh, Pa.

O'Toole, J. L.,
Car Accountant,
Pittsburgh Coal Company,
Pittsburgh, Pa.

Palmer, C. A.,
Secty. & Treas.
Youngstown Car Mfg. Co.,
Gazette Building,
Pittsburgh, Pa.

Parker, H. G.,
Shipper,
Pittsburg Coal Company,
232 Fifth Ave.,
Pittsburgh, Pa.

Partington, Jas.
Chief Draftsman,
American Locomotive Co.,
Allegheny, Pa.

Patterson, J. W. Jr.,
Supt. Wabash-Pittsburgh
Terminal Ry. Co.,
Pittsburgh, Pa.

Paxton, J. L.,
General Superintendent,
Union Stock Yards & R. R. Co.,
South Omaha, Neb.

Peach, Wm. M.,
Chief Est. Pressed Steel Car Co.,
McKees Rocks, Pa.

Peacock, W. W.,
Salesman, Baird Mach'y Co.,
Pittsburgh, Pa.

Pelletier, Louis,
Rest. Manager,
Railway Age.,
Frick Building,
Pittsburgh, Pa.

Perine, D. M.,
Master Mechanic,
Pennsylvania R. R. Co.,
Philadelphia, Pa.

Pfeil, John,
General Manager,
American Spiral Spring and Mfg. Co.,
Pittsburgh, Pa.

Piercy, C. B.,
Engr. of Const.,
Pressed Steel Car Co.,
McKees Rocks, Pa.

Pitt, Wm. R.,
Chief Clerk, B. & O. R. R. Co.,
Glenwood,
Pittsburgh, Pa.

Pittis, Edward A.,
Rep., Midvale Steel Co.,
111 Broadway,
New York, N. Y.

Platt, A. T.,
C. C. to S. R. S.,
Pittsburgh Coal Co.,
Coraopolis, Pa.

Pogue, Robert,
Fore. Boiler Shop, Penna. Co.,
1415 Franklin St.,
Allegheny, Pa.

Polk, W. A.,
Rep. Patterson Sargent Co.,
42 Hudson St.,
New York, N. Y.

Pomeroy, L. R.,
Special Rep. Ry. Dept.,
General Electrical Co.,
44 Broad St.,
New York, N. Y.

Porter, Chas.,
General Agent,
Youghiogheny & Ohio Coal Co.,
No. 910 House Building,
Pittsburgh, Pa.

Porter, George,
Asst. Cashier, Pass. Dep't.,
Penna. Lines West,
Union Station,
Pittsburgh, Pa.

Porter, H. V.,
C. C. to Pur. Agent,
B. & L. E. R. R. Co.,
Carnegie Bldg.,
Pittsburgh, Pa.

Porter, Hon. H. K.,
President,
H. K. Porter & Co.,
541 Wood St.,
Pittsburgh, Pa.

Porter, H. T.,
Chief Engineer,
B. & L. E. R. R. Co.,
Greenville, Pa.

Post, Geo. A.,
President,
Standard Coupler Co.,
160 Broadway,
New York, N. Y.

Post, Wm. J.,
Auditor,
B. & L. E. R. R. Co.,
Carnegie Building,
Pittsburgh, Pa.

Poster, Sam'l.,
Supt. Lockhart Iron & Steel Co.,
Esplen, Pittsburgh, Pa.

Postlethwaite, C. E.,
Manager of Sales,
Central District,
Pressed Steel Car Co.,
Farmers Bank Building,
Pittsburgh, Pa.

Powell, F. H.,
Train Master, P. C. & Y. Ry.,
McKees Rocks, Pa.

Prall, W. M.,
Com., Pittsburgh Car
Service Assoc.,
Westinghouse Bldg.,
Pittsburgh, Pa.

Pratt, Howard A.,
Rep. Hukill-Hunter Co.,
311 First Ave.,
Pittsburgh, Pa.

Prendergast, J. F.,
Master Mechanic,
B. &. O. R. R. Co.,
Glenwood, Pa.

Prosser, C. S.,
Asst. Manager,
Peerless Rubber Mfg. Co.,
16 Warren St.,
New York, N. Y.

Prout, Col. H. G.,
V. P. & Genl. Mangr.,
Union Switch & Signal Co.,
Swissvale, Pa.

Proven, John,
Superintendent,
Pittsburgh Spring & Steel Co.
Farmers Bank Buillding,
Pittsburgh, Pa.

Quest, F. E.,
Foreman of Painters,
P. & L. E. R. R. Co.,
312 Arabella St.,
Knoxville, Pittsburgh, Pa.

Quest, W. O.,
Foreman Painter,
P. & L. E. R. R. Co.,
McKees Rocks, Pa.

Raymer, A. R.,
Asst. Chief Engineer,
P. &. L. E. R. R. Co.,
General Office,
Pittsburgh, Pa.

Reagan, P. J.,
Rep. Pgh. Rubber & Leather Co.,
10 and 12 Wood St.,
Pittsburgh, Pa.

Redding, D. J.,
Master Mechanic,
P. & L. E. R. R. Co.,
McKees Rocks, Pa.

Redus, Avery E.,
Supervisor, Pgh. Car Service Association,
Westinghouse Bldg.,
Pittsburgh, Pa.

Reiley, E. S.,
General Manager,
Ft. Pitt Malleable & Gray Iron Co.,
326 Fourth ave.,
Pittsburgh, Pa.

Reed, James,
Civil Engr., Pressed Steel Car Co.,
McKees Rocks, Pa.

Reese, F. T.,
Special Representative,
Westinghouse Air Brake Co.,
Pittsburgh, Pa

Reese, E.,
Gen'l Yard Master P. & L. E. R. R.
1041 Wilson Ave.,
Youngstown, Ohio.

Reeve, F. J.,
Gen'l Fore. Pittsburgh Coal Co.,
Coraopolis, Pa.

Reid, John, Jr.,
Mangr. Brick Dept.,
International Supply Co.,
Frick Bldg.,
Pittsburgh, Pa

Rhodes, G. P.,
Secretary and Treasurer,
Penna. Casting & Machine Co.,
505 Preble Ave.,
Allegheny, Pa.

Rhodes, Jas. D.,
President,
Penna. Casting & Machine Co.,
505 Preble Ave.,
Allegheny, Pa.

Richardson, W. P.,
Mechanical Engineer,
P. & L. E. R. R. Co.,
General Office,
Pittsburgh, Pa.

Richardson, E. M.,
Manager,
Sherwin-Williams Co.,
66 Broadway,
New York, N. Y.

Rickabaugh, J. A.,
Inspector,
Pennsylvania R. R. Co.,
608 Seventh Ave.,
Altoona, Pa.

Riddle, Walther,
V. P., Sterling Varnish Co.,
820 Ridge Ave.,
Allegheny, Pa.

Rider, J. B.,
Chief Clerk,
Pressed Steel Car Co.,
Farmers Bank Building,
Pittsburgh, Pa.

Riley, J. W.,
Superintendent,
P. & L. E. R. R. Co.,
General Office,
Pittsburgh, Pa.

Riley, Geo. N.,
Supt. Motive Power,
McKeesport Connecting R. R. Co.,
Frick Building,
Pittsburgh, Pa.

Roberts, John R.,
C. C. to Genl. Supt., Monon. Con. R. R. Co.,
Second Ave., near Bates St.,
Pittsburgh, Pa.

Robinson, Fred M.,
Pressed Steel Car Co.,
Farmers Bank Building,
Pittsburgh, Pa.

Rodgers, C. W.,
C. C. Car Dep't. B. R. & P. Ry. Co.,
DuBois, Pa.

Rosenstock, J. H.,
Genl. Yard Master,
B. & O. R. R. Co., Division
& Monroe Sts.,
New Castle, Pa.

Ross, Philip,
Rep. The Cooper Process Co.,
Arrott Building,
Pittsburgh, Pa.

Safford, J. B.,
Supt. P. C. & Y. Ry. Co.,
General Office,
P. & L. E. R. R. Co.,
Pittsburgh, Pa.

Sage, Henry J.,
Electrical Engineer,
Crocker-Wheeler Co.,
607 Empire Building,
Pittsburgh, Pa.

Sanborn, John G.,
Damascus Brake Beam Co.
Fisher Bldg.,
Chicago, Ill.

Sandman, A. G.,
Chief Draftsman, B. & O. R. R.,
Mt. Clare, Baltimore, Md.

Sargent, F. W.,
Chief Engineer,
American Brake Shoe &
Foundry Co.,
Mahwah, N. J.

Sattley, E. C.,
Traffic Manager,
Page Woven Wire Fence Co,.
Monessen, Pa.

Schauer, A. J.,
Asst. Train Master,
Pennsylvania R. R. Co.,
Monongahela City, Pa.

Scheck, H. G.,
Road Foreman Engines,
Monon. Div. P. R. R. Co.,
32d St., S. S.,
Pittsburgh, Pa.

Schleiter, W. F.,
Sec'y Dilworth, Porter & Co.,
313 Sixth Ave.,
Pittsburgh, Pa.

Schmoll, G. A.,
S. M. P., B. & O. R. R. Co.,
Wheeling, W. Va.

Schoen, C. T.,
President,
Schoen Steel Wheel Co.,
Arcade Building,
Philadelphia, Pa.

Schoen, W. H.,
President,
Pennsylvania Malleable Co.
Frick Building,
Pittsburgh, Pa.

Schoeneman, Chas. J.,
313 Gross St.,
Pittsburgh, Pa.

Schoonmaker, J. M.,
Vice Pres. & Gen'l Manager,
P. & L. E. R. R. Co.,
General Office,
Pittsburgh, Pa.

Schomberg, Wm. T.,
Blacksmith Foreman,
Pennsylvania Company,
1217 Buena Vista St.,
Allegheny, Pa.

Scott, Chas., Jr.,
Vice Prest. Railway Steel
Spring Co.,
71 Broadway,
New York, N. Y.

Scull, J. W.,
Pur. Agent, Pressed Steel Car
Co.,
Pittsburg, Pa.

Searle, J. M.,
Cons. Engr., Pgh. Stoker &
Mfg. Co.,
2525-45 Liberty St.,
Pittsburgh, Pa

Searles, E. J.,
Rep. Am. Brake Shoe and Fdy.
Co.,
170 Broadway,
New York, N. Y.

Searles, J. R.,
Superintendent,
Pressed Steel Car Co.,
McKees Rocks, Pa.

Setchel, J. H.,
Gen'l Sales Manager,
Jerome & Elliott,
37 Canal St.,
Chicago, Ill.

Shafer, W. L.,
Railroad Editor,
Pittsburg Gazette,
Pittsburgh, Pa.

Shaler, Fred J.,
Secretary,
American Zinc & Chemical Co.,
Farmers Bank Building,
Pittsburgh, Pa.

Shannon, Chas.,
Rep. Lowe Bros.,
Dayton, Ohio.

Shaw, O. M.,
Fore. Carpenter B. & O. R. R. Co.,
Glenwood, Pa.

Shaw, W. F.,
Chief Draftsman, M. P. Dept., P. & L. E. R. R. Co.,
General Office,
Pittsburgh, Pa

Shepard, L. A.,
Mgr. of Sales—Benjamin-Atha & Co.,
Newark, N. J.

Sherman, C. W.,
Manager,
Fort Pitt Mall. and Grey Iron Co.,
Box 1054,
Pittsburg, Pa.

Shields, H. S.,
Rep. Flood & Conklin Co.,
Newark, N. J.

Schoyer, A. M.,
Gen'l Supt. Penna Lines West
Pittsburgh, Pa.

Shuck, Wm. C.,
with Lockhart Iron and Steel Co.,
Pittsburgh, Pa.

Shults, F. K.,
Eastern Sales Agent,
Camel Company,
95 Liberty St.,
New York, N. Y.

Shupe, C. W.,
Inspector, P. & L. E. R. R. Co.
Smithton, Pa.

Sickle, Welling G.,
Vice President,
United & Globe Rubber Mfg. Co.,
Trenton, N. J.

Simm, J. C.,
Treas., Machinists Supply Co.,
Water Street,
Pittsburgh, Pa.

Simons, J. E.,
General Manager,
Fitz-Hugh, Luther Co.,
Monadnock Block,
Chicago, Ill.

Sinclair, Angus,
President and Editor,
Ry. and Locomotive Engineering,
136 Liberty St.,
New York, N. Y.

Sipe, Geo. T.,
Tres. Jas B. Sipe & Co.,
400 Federal St.,
Allegheny, Pa.

Skelton, F. A.,
Asst. Auditor,
Pressed Steel Car Co.,
Farmers Bank Bldg.,
Pittsburg, Pa.

Slack, L. M.,
Rep. Buckeye Malleable Iron and Coupler Co.,
Care Holland House.
New York, N. Y.

Slifer, Hiram J.,
care J. G. White & Co.,
43-49 Exchange Place,
New York, N. Y.

Slocum, A. W.,
General Superintendent,
National Car Wheel Co.,
Park Building,
Pittsburgh, Pa.

Slocum, C. V.,
Mang'r. K-Branch
National Car Wheel Co.,
West Homestead, Pa.

Slocum, Ernest F.,
General Agent,
Safety Car Heating and Lighting Co.,
160 Broadway,
New York, N. Y.

Smith, Chas. G.,
Chas. G. Smith Co.,
Park Bldg.,
Pittsburgh, Pa.

Smith, D. W.,
Foreman Painter,
Pennsylvania Lines West,
Allegheny, Pa

Smith, Harley G.,
Rep. Cleveland Twist Drill Co.
Cleveland, O.

Smith, Jas. L.,
Asst. Fore., Penna. Co.,
Grand Ave.,
Allegheny, Pa.

Smith, Ross W.,
Bellevue, Pa.

Smith, Sam'l L.,
Manager,
National Malleable Casting Co.,
Cleveland, O.

Smith, Willard A.,
President,
Railway Review,
Manhattan Building,
Chicago, Ill.

Snyder, Antes,
E. of R. of W., P. R. R. Co.,
Union Station,
Pittsburgh, Pa.

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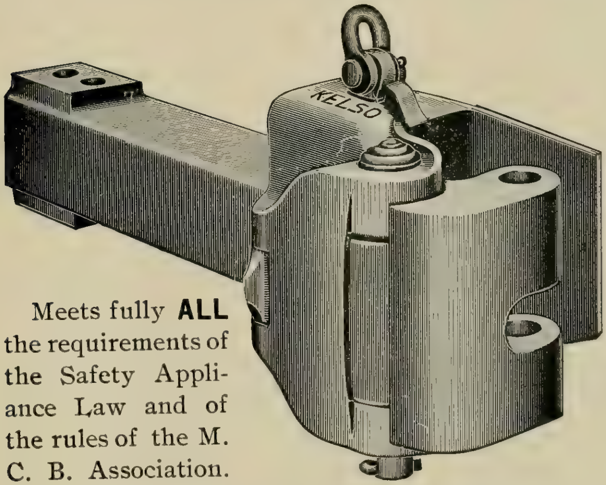

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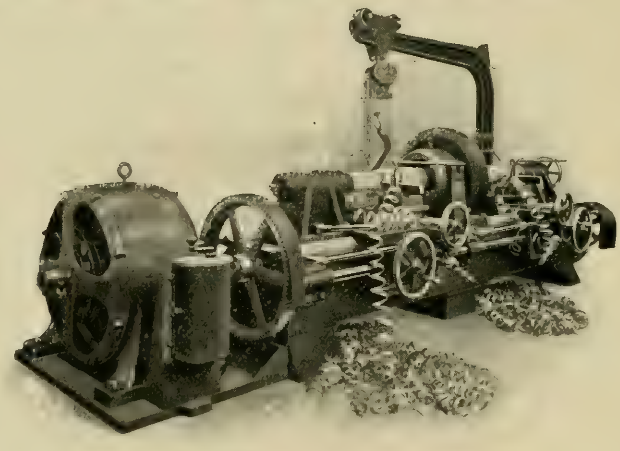

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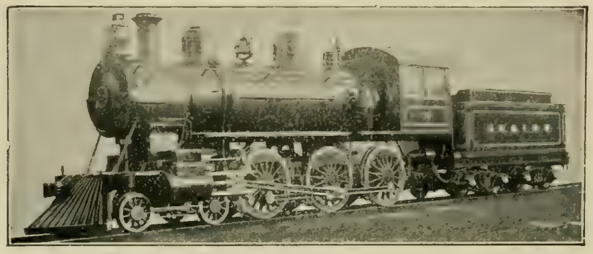

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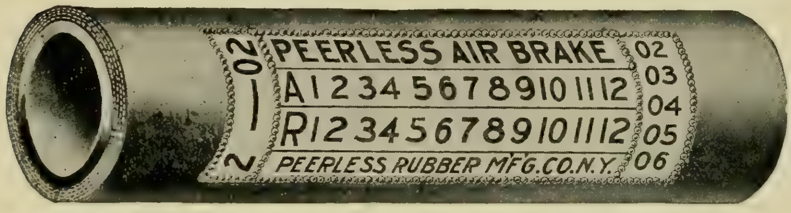
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